DOCUMENT RESUME

ED 209 497 CE 030 525

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TITLE Assessing the Generalizable Skills of Post-Secondary Vocational Students. A Validation Study.
INSTITUTION Minnesota Univ., Minneapolis. Dept. of Vocational and Technical Education.
PUB DATE [81]
NOTE 95p.

EDRS PRICE MF01/PC04 Plus Postage.
DESCRIPTORS *Basic Skills; Communication Skills; Educational Diagnosis; Interpersonal Competence; *Postsecondary Education; Questionnaires; Reading Skills; Self Evaluation (Individuals); *Student Evaluation; Surveys; Teacher Attitudes; *Test Reliability; *Test Validity; *Vocational Education
IDENTIFIERS Likert Scales; Mathematics Skills; Minnesota

ABSTRACT

A study examined the feasibility, reliability, and validity of two instruments designed to assess the degree to which postsecondary vocational students possessed those generalizable skills that are believed to be functionally relevant to success in a vocational program. The instruments, a student self-rating and a teacher rating form, contained 81 Likert-scale items measuring students' mathematics, communications, interpersonal, and reading skills. Completing the instruments were 18 teachers and 161 students enrolled in one of five different vocational programs in one Minnesota postsecondary vocational school. A concurrent validation research design was used to test the reliability and validity of the ratings, while controlling for type of vocational program, sex of student, and the mathematics and reading aptitude of the student as measured by standardized test scores. While data indicated that both student and teacher ratings of generalizable skills produced high coefficients of internal consistency for all control variables, evidence did not support the concurrent validity of the student and teacher ratings of generalizable skills in relationship to the students' standardized aptitude scores. In addition, the ratings were not sensitive to differences in reading aptitude scores. Recommendations called for further research involving revisions in the instrument and use of different populations. (MN)

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ED209497

Minnesota Research and Development Center
for Vocational Education
Department of Vocational and Technical Education
University of Minnesota
Minneapolis, Minnesota

Assessing the **GENERALIZABLE SKILLS** of Post-Secondary Vocational Students

A Validation Study

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Assessing the **GENERALIZABLE SKILLS** of Post-Secondary Vocational Students

A Validation Study

James P. Greenan
and
Brandon B. Smith

PREFACE

The Minnesota Research and Development Center for Vocational Education, University of Minnesota, has for the past several years, been conducting a program of research pertaining to special needs students enrolled in vocational education programs. This focus is consistent with Federal legislation (Public Law 94-142 (The Education for all Handicapped Children Act of 1975), Public Law 94-482 (Vocational Education Amendments of 1976) as well as its application for special needs learners in the State of Minnesota.

While there is a general concern for appropriate educational opportunities and programs for special needs learners at all levels of education, that need becomes even more critical when the focus of the educational program is preparation for the world of work and employment.

The purpose of the research report is to present and discuss the results of a study designed to determine the feasibility, reliability and validity of a set of instruments designated to assess those generalizable skills which are most functionally relevant to the perceived success of post-secondary students enrolled in various vocational and technical education programs.

It was anticipated that if the student self-ratings and teacher-ratings of the generalizable skills of students were shown to be reliable and valid, the use of the instruments may provide a practical procedure by which to identify students who possess functional learning disabilities which may hamper their success in a vocational program.

It is believed that this initial study of generalizable skills may provide a point of references from which other research may be generated that would be related to the general question: How can school officials and vocational teachers identify those learners who may have difficulty in succeeding in a vocational program of their choice. "The Generalizable Skills Instrument" represents one approach by which this question may be answered.

ABSTRACT

The purpose of this study was to determine the reliability and validity of two instruments designed to assess the degree to which post-secondary vocational students possessed those generalizable skills which are believed to be functionally relevant to success in a vocational program. One instrument was completed by students the other was completed by teachers for each student in their class. It was believed that if both the student self-ratings and teacher ratings of generalizable skills of students were reliable and valid, they may have potential for identifying vocational students who may have functional learning disabilities which inhibit their succeeding in a vocational program. The rationale for the study suggested that students and teachers may be in the best position for assessing those generalizable skills which are believed to be most functionally relevant to the content of and subsequent success of a student in a vocational program.

The student and teacher form of the generalizable skills instrument contained 81 Likert scale items which measured (a) mathematics, (b) communication, (c) interpersonal skill, and (d) reasoning skills. Students were asked to assess the degree to which they possessed these skills and teachers also assessed the degree to which each student in their class possessed these skills. A concurrent validation research design was used to test the reliability and validity of the student self-ratings and teacher ratings while controlling for (a) type of vocational program. (b) sex of student, and (c) the mathematics and reading aptitude of the student as measured by their standardized test scores.

The population consisted of a purposive sample of 18 teachers and 161 students enrolled in one of five different vocational programs in one post-secondary vocational school in Minnesota. The five programs were classified in three ways for analysis purposes: (1) male dominated programs, (2) female dominated programs, and (3) balanced programs in which 50% of the students were male and female respectively.

The findings and conclusions of the study are presented for each of the three objectives of the study which relate to (1) the reliability of student and teacher rating, (2) the concurrent validity of student and teacher rating

in relationship to the standardized mathematics and reading aptitude scores of students and (3) the sensitivity of the student and teacher rating to (a) program differences, (b) sex differences, and (c) student mathemtics and reading aptitude differences.

Reliability

1. The findings and conclusions show that both student and teacher ratings of generalizable skills produce high coefficients of internal consistency for (a) each of the five separate vocational programs, (b) male, female dominated and balanced programs, (c) for students with high, average, and low aptitudes in mathematics and reading, and (d) each of the four scales of the generalizable skills instrument.
2. Test-retest reliability for both student and teacher rating of generalizable skills were also shown to be quite reliable and stable for (a) each of the five vocational programs, (b) male, female dominated and balanced programs, (c) students of high, average, and low mathematics and reading aptitude. However, the test-retest reliability for some of the scales of the generalizable skills instrument proved to be unstable for three of the five different vocational programs.

Concurrent Validity

3. There was a lack of evidence to support the notion of the concurrent validity of both student self-ratings and teacher ratings of generalizable mathematics, and communication skills in relationship to the standardized mathematics and reading aptitude scores of students. All correlations between student self-ratings of generalizable mathematics and communication skills and their respective standardized mathematics and reading test scores were all positive, but quite low and not statistically significant. The same was true for the relationship of teacher ratings of generalizable mathematics and communication skills and the standardized scores of students.

Construct Validity

4. Both student self-ratings and teacher ratings of generalizable skills were shown to be sensitive to (a) sex differences as reflected in male female dominated and balanced programs and (b) differences in generalizable mathematics skills. The ratings were not sensitive to differences in reading aptitude scores. This finding may suggest that individuals who enroll in male or female dominated programs already possessed differences in mathematics and reading aptitudes, but at least with the ratings of

generalizable mathematics skills, these differences are consistent with students who are known to have high, average, and low mathematics aptitudes within each of the three different sex dominated programs.

Two sets of recommendations were suggested for further research: (1) make revisions in some items in the current instruments and test them with new and different populations while controlling for (a) sex, (b) program, and (c) aptitude differences and (2) to conduct further research using different populations and multivariate techniques to control for relevant student teacher demographic characteristics.

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CHAPTER I

INTRODUCTION

Nature of the Problem

There is a growing concern for dealing more effectively with students at all levels of education in terms of their abilities to achieve success within the regular classroom. Public Laws 94-142 (The Education for All Handicapped Children Act of 1975) and 94-142 (The Vocational Education Amendments of 1976) and numerous litigations have made it mandatory that handicapped and disadvantaged students be (1) provided an Individualized Education Plan (IEP), (2) placed in a least restrictive environment (LRE), (3) periodically assessed to determine the extent to which progress on the IEP is being made and revised accordingly, and (4) periodically assessed to determine their ability to function appropriately within the regular classroom.

Increased public pressure has encouraged schools to become more aware of and concerned about the unique, differential needs of students who may be educationally handicapped or disadvantaged, and to diagnose and prescribe appropriate educational activities accordingly. This concern has been translated into a concept called "mainstreaming" which suggests that all students regardless of their handicapping or disadvantaged condition be integrated within regular classes. In most instances, neither teachers nor other school personnel have the time or reliable, valid instruments or procedures to appropriately assess the degree of the functional learning abilities or disabilities of students in their regular classroom.

While this problem exists across the field of education, it has become even more of a problem for vocational schools and teachers. Students typically enroll in vocational programs based upon their expressed or measured interest in a particular occupation which is perceived to be consistent with their needs, abilities, or aptitudes.

Vocational education programs also attract students with diverse abilities (usually lower ability students) some of whom may or may not be able to successfully complete the requirements of the programs. It would be most desirable if the schools had access to reliable, valid instruments

and procedures for identifying the specific functional skills necessary for students to achieve success in their chosen vocational program. Specialized or remedial work could then be recommended in particular skills areas, thus allowing students to more effectively complete all or most of the requirements of the vocational program.

Significance of the Problem

The fields of medicine, psychology, sociology, and others have developed and used standardized and/or procedures tests to assess the abilities, aptitudes, achievements, and intelligence of students at all levels of education. The instruments have been validated for specific purposes and for specific groups of students. However, many of these tests are very expensive to purchase, require specialized skills to administer and interpret, and classify students with little regard to the relationship of the actual skills required to successfully complete a vocational program. Many of these tests and procedures also have not been validated for specific vocational student populations, thus they may have limited application for assessing the educational needs of vocational students. What appears to be most practical and useful are instruments and procedures which teachers can use to identify students who may have difficulty succeeding within their specific instructional program and then to modify the content or teaching methods accordingly.

Purpose of the Study

The purpose of this study was to assess the feasibility, reliability, and validity of a set of instruments to judge the extent to which post-secondary vocational students possessed those generalizable skills which are believed to be most functionally relevant to their chosen vocational program.

The rational for the study suggests that (1) students enrolled in post-secondary vocational programs are capable of producing reliable and valid self-ratings of generalizable vocational skills which are known to be related to the content of the specific vocational program in which they are enrolled and (2) teachers are capable of rating the extent or degree to which each student in their class possesses the generalizable vocational skills necessary for students to possess in order to succeed in the

vocational program they are teaching.

Given this rational for student self-rating of generalizable skills and teacher ratings of the generalizable vocational skills of students in their classes, the following three objectives were specified for the study:

(1) To determine the reliability of the student self-rating of generalizable skills and the teacher rating of the generalizable skills of students as estimated by (a) Cronbach's test of internal consistency and (b) test-retest reliability.

(2) To determine the correlation (concurrent validity) between (a) the student self-rating of generalizable mathematics and communication skills and their respective standardized mathematics and reading aptitude scores and (b) the correlation of the teacher rating of the generalizable mathematics and communication skill of students in their classes and the respective standardized mathematics and reading aptitude scores of each student.

(3) To determine the construct validity of the student self-ratings and teacher ratings of the generalizable skills in terms of the sensitivity of the ratings to discriminate among (a) program type, (b) student mathematics aptitude differences, and (c) student reading aptitude differences.

Each of these three objectives will provide information necessary to make judgments about the feasibility, reliability, and validity of the student self-rating and teacher ratings of the generalizable vocational skills of students for the purpose of assessing the functionally relevant learning skills of post-secondary vocational students.

CHAPTER II

REVIEW OF LITERATURE

It is becoming increasingly important to provide students and teachers with practical instruments and procedures which could be used to identifying the functional learning abilities and/or disabilities of students enrolled in vocational programs. The development of these kinds of instruments and procedures must include adequate assessments of their reliability and validity. In order to investigate the problem more closely, this chapter is organized around three major areas, (1) traditional methods for classifying students, (2) generalizable skill studies, and (3) research pertaining to student self-ratings and teacher ratings of students.

Traditional Classification System

Traditional classification systems currently used to diagnose students are controversial. This is primarily because of the stigma frequently associated with labeling students who have particular handicaps or disadvantages with little or no regard to the educational program of the student. Each classification system uses tests and procedures which attempt to identify, diagnose, or classify students in various ways. The tests or procedures differ primarily in terms of the construct being measured. Whatever classification system is used, their general purpose is to search for an etiology, make a prognosis, and select a therapy (Zubin, 1967). However, Reynolds and Balow (1972) claim that these purposes have limited utility as an educational approach for diagnosing learning problems and delivering instruction to students. Some of the major and frequently used classification systems and their subsequent diagnostic tests and procedures are reviewed. The tests/procedures are analyzed in terms of their purposes, target populations, reliability, validity, and limitations.

Medical Classification Systems

The medical classification system focuses on pathological symptoms of abnormality as a basis for classifying students. Normality is considered

the absence of pathology. The medical classification model represents an attempt to develop a procedure which is consistent with the concepts of modern medicine and regards a handicap or disadvantage as a function of some underlying disease or medical condition (Heber, 1959, 1961; Sanders, 1970; Denckla; 1972; Grossman, 1973).

Wilson and Spitzer (1969) cited several medical classification models which classify students; The Diagnostic and Statistical Manual of Mental Disorders (DSM-II) developed by the American Psychological Association; the International Classification of Disease (ICDA) developed by the World Health Association; and the Manual on Terminology and Classification on the Mentally Retarded (AAMD), developed by the American Association on Mental Deficiency. These medical models use several different attributes to classify students [e.g., measured intelligence, adaptive behavior, personal-social factors (cultural conformity, interpersonal relations, and responsiveness), and sensory-motor factors (motor skills, auditory skills, visual skills, and speed skills). They basically differ in terms of the emphasis placed on diagnosis, and the procedures for recording the severity of the disease or condition.

The Bender-Gestalt test is an example of a procedure used to classify students according to medical symptoms (Anastasi, 1976). This test measures visual motor abilities to detect brain damage in individuals who are five years old and older. The test requires subjects to respond to a visual stimulus by reproducing a series of figures either while the figures are present or after they have been removed. The assumption is that if subjects have difficulty performing the visual motor tasks, they may have a degree of brain damage.

The Bender Gestalt test has an estimated retest reliability coefficient of $r = .70$ and interrater reliability coefficient of $r = .90$. A concurrent validity estimate of $r = .74$ is reported with the Visual Retention Test. The reliability and validity of the Bender-Gestalt test may be appropriate for diagnosing brain damaged children, however, it requires specialists to interpret the results and is used primarily with individuals rather than groups of individuals. Except in rare instances, it probably has limited value for designing educational programs for public school students.

Statistical Classification Systems

Statistical classification procedures are often used in education and psychology to classify students according to their position on a normal distribution of some attribute. The attributes which may be used to classify students are: intelligence, achievement, aptitude, and other psychological traits.

Those students who score within one standard deviation above or below the mean on such a distribution are considered "normal" and include about 68% of the population. The extremes beyond the 68% are classified as "abnormally" nigh and low respectively. The earliest application of this procedure categorized mentally retarded students as idiot, imbecile, and moron, based on their level of measured intelligence (Flanagan, Baker, and Lafollette, 1970). Based on measures of intelligence, the President's Panel of 1967 recommended the use of four different classifications of mentally handicapped students representing a continuum of mentally "handicappedness": mild, moderate, severe, and profoundly handicapped. Currently, procedures to classify students in these ways have tended to be rejected in favor of diagnosing individual learner needs.

Intelligence Tests and Developmental Scales

Intelligence tests and developmental scales are extensively used to classify students according to psychological, behavioral, and intellectual characteristics. The Stanford-Binet Intelligence Scale (SBIS) is a test which measures intellectual rate of progress, and predicts academic achievement primarily for children of ages 2-14 (Buros, 1978). It provides a set of tests for assessing the intelligence of learners ranging from as young as two-year-olds to tests suitable for adults. For example, at the two and one-half-year level, learners identify objects by use, identify parts of the body, name objects, use picture vocabulary, repeat two digits, and respond to obeying simple commands. At the twelve-year level, students are tested on: vocabulary, verbal absurdities, picture absurdities, repeating five digits reversed, numbers, abstract words, and sentence completion.

Student intelligence quotient (IQ) is determined by the ratio of the total test score to the mental age (MA) and chronological age (CA) of the student. The assumption is that if the student's IQ is 100 plus or minus

one standard deviation (15 points), he or she is considered to be "normal." Scores above one standard deviation are interpreted as above average or gifted; scores below one standard deviation are interpreted as the below normal and fall into the ranges of mentally deficiency.

The SBIS has obtained an internal consistency reliability estimate of r = .90. Content validity is provided through examination of the tasks to be performed by the examinees on the various scales. The SBIS has an estimated concurrent validity of r = .73 with the Wechsler Intelligence Scale for Children. Various studies have found predictive validity estimates of the SBIS with several unspecified measures of academic achievement in the range of r = .40 to .75. An unsubstantiated construct validity estimate of r = .66 has been reported (Buros, 1978).

Although the SBIS has some reliability and validity information indicating its ability to measure intelligence, it measures only part of the construct referred to as intelligence. The test is time consuming and requires psychologists to administer and interpret the results. The SBIS offers minimal practical diagnostic information to the teacher because it primarily yields a number representing the relative intellectual position of a student to some appropriate norm group. It may or may not be helpful for a teacher to know the IQ of a student which may or may not be related to the content of their educational program.

The Wechsler Intelligence Scale for Children Revised Version (WISC-R) is another intelligence test designed for children from ages 7-15 (Buros, 1978). The WISC-R consists of a verbal and a performance scale. Student IQ is expressed in terms of a verbal IQ, performance IQ and total IQ. The WISC-R yields split-half reliabilities of r = .94 for the verbal scale, r = .90 for the performance scale and r = .96 for the total scale. The test also has estimated retest reliabilities of r = .93 for the verbal scale, r = .90 for the performance scale, and r = .95 for the total scale. The WISC-R has an estimated concurrent validity of r = .95 with the Weshsler Adult Intelligence Scale. Standardized administration and scoring procedures require the skills of specialized personnel and is not typically administered by a classroom teacher. The WISC-R tends to classify students according to their relative position to other students who took the test and suggests minimal information in terms of identifying the specific learning problems of students. The results of the WISC-R does

not suggest direct recommendations for the remediation of students enrolled in educational programs.

The Wechsler Adult Intelligence Scale (WAIS) was developed for individuals 16 years and older (Buros, 1978). It is organized by subtests with scales representing types of tasks. IQ scores are obtained for the verbal, performance, and total score. The verbal scale subtests include general information, general comprehension, arithmetic reasoning, similarities, digit span, and vocabulary. The performance scale subtests include digit-symbol substitution, picture completion, block design, and picture arrangement. The WAIS has obtained odd-even reliabilities of r = .96 for the verbal scale, r = .94 for the performance scale, and r = .97 for the total test. Minimal validity information is currently available for the WAIS, but investigators are continuing their work with the test. The WAIS is typically not used by classroom teachers because it requires specialized personnel for administration. The test is also time consuming and is not diagnostic in terms of identifying specific student learning problems.

The Lorge-Thorndike Intelligence Test is another intelligence test designed for students from ages 5-18 (Anastasi, 1976). Non-reading tests are available for use in the primary grades while verbal, and non-verbal tests are available for grades 4 through 13. Each test consists of several subtests within which the items are of the same type and progress from easy to difficult. The primary test (Cognitive Ability Test) has four subtests: oral vocabulary, relational concepts, multimental, and quantitative concepts. The verbal test includes five subtests. The non-verbal tests includes figure analogies, number series, and figure classification. The test has estimated internal consistency reliabilities ranging from r = .83 to .91 for the verbal scale and r = .80 to .88 for the non-verbal scale. Total instrument reliability information is not available. Concurrent validity estimates obtained are between r = .60 to .80 with other unspecified achievement tests. The Lorge-Thorndike Intelligence test administration involves a time consuming process and is typically not administered by teachers. The test results may also have no direct relationship to the content of educational programs, and may not assist identifying students with functional learning problems. They do indicate to teachers the general intellectual capabilities of the

learner which may indirectly assist the teacher to make allowances for slower learners.

General Achievement Tests

General achievement tests are also used to classify students. The Iowa Test of Basic Skills (ITBS) was developed for students in grades 3-9 (Buros, 1978). The battery yields 15 scores: vocabulary (one score), reading comprehension (one score), language (four subscores and one total score) work-study skills (three subscores and one total score), arithmetic skills (two subscores and one total score), and a composite score. The battery emphasizes the appraisal of functional skills needed by students if they are to succeed in academic educational programs. The ITBS has obtained a split-half reliability ranging from r = .92 to .98 for the composite score. Equivalent alternate form reliability estimates ranging from r = .97 to .99 have also been obtained. However, minimal validity information is available for the ITBS. The testing procedure is very time consuming and expensive to administer. Although the ITBS has very high reliability estimates which indicates its ability to accurately diagnose the functional abilities of students, it has not been normed for vocational students.

The Metropolitan Achievement Test (MAT) is another standardized achievement test designed for students in grades 9-13 (Buros, 1978). The battery consists of 11 subtests: (1) reading, (2) spelling, (3) language arts, (4) language study skills, (5) social study skills, (6) social studies vocabulary, (7) social studies information, (8) mathematical computation and concepts, (9) mathematical analyses and problem solving, (10) scientific concepts and understandings, and (11) science information. The language, mathematics, science, and social studies subtests are available as separate tests. Alternate form reliability coefficients for grades 10 and 11 combined produced coefficients ranging from r = .72 to .90 with a median of approximately r = .84. Split-half reliabilities for grades 10 and 11 combined are slightly higher. Internal consistency reliability coefficients (KR-20) for a single grade range between r = .82 to .88. Minimal validity data are currently available on the test. Although the MAT has reasonably high reliabilities which indicate its ability to accurately measure achievement, it is a very time consuming test to administer and requires specialized personnel to interpret results. Because the tests

were developed and standardized for general education, academic students, the norms would seem to have limited uses for vocational students at this time.

The General Aptitude Test Battery (GATB) is a standardized achievement test designed to assess the vocational potential of students in grades 9-12 and adults (United States Department of Labor, 1967). The individual tests measure the following nine aptitudes which are common among several occupations: (1) G-intelligence, (2) V-verbal aptitude, (3) N-numerical aptitude, (4) S-spatial aptitude, (5) P-form perception, (6) Q-clerical perception, (7) K-motor coordination, (8) F-finger dexterity, and (9) M-manual dexterity. The GATB has obtained test-retest (one week to one year intervals) reliability coefficients ranging from r = .80 to .90 for the individual tests. However, practice effect was consistently obtained for each of the aptitude scales. Concurrent validity estimates between spatial aptitude of the GATB and the spatial aptitude scales of the Differential Aptitude Test, Primary Mental Abilities Test, and the Revised Minnesota Paper Form Board Test are generally above r = .90. The GATB has been used to assess vocational students in Minnesota (Nelson, Pucel 1971), and is probably the most relevant test for vocational populations of those which exist. Nelson and Pucel developed specific norms for various scales of the GATB and for several post-secondary occupational programs.

Nelson and Pucel (1972) in the final report of the Mini Score project, indicated that the scores on the GATB were not related to the success of students in various vocational programs, nor for success on-the-job one year after graduation. Apparently all post-secondary vocational students possess quite similar skills as measured by the scales of the GATB, and thus do not differentiate successful from non-successful students in terms of school and on-the-job success.

Hence, while scores on the GATE may be helpful for guidance purpose, and provide a comprehensive assessment of what are believed to be attributes related to success in a vocational program, the scores do not seem to be related to the success of the program graduates. Based on this logic, it would seem that the GATB would have limited value for classifying students on the basis of which students may or may not have difficulty learning the content of a specific vocational program.

Diagnostic and Criterion Referenced Tests

Diagnostic and criterion referenced tests are also used extensively to classify students according to psychological or behavioral attributes. The Basic Skills in Arithmetic (BSIA) test is designed for students in grades 6-12, but is also commonly used with adults (Buros, 1978). The test contains various kinds of arithmetic problem solving items, such as: addition, subtraction, division, multiplication, and fractions. There are 68 items on the test, and the student scores are determined by the number of total correct items. High, middle, and low ability students are commonly identified in terms of scores in the range of 68 to 47, 46 to 24, and 23-0 respectively. The BSIA test has estimated internal consistency reliabilities (KR-20) between r = .86 and .98 for grades 6-12. No validity information was reported for the BSIA. The BSIA measures arithmetic abilities in a gross way with the total score indicating general mathematics ability. Although the BSIA was not validated specifically for vocational populations and programs, it may, however, provide vocational teachers with some indication of the general mathematic abilities of their students.

The Nelson-Denny Reading Test is designed for students in grades 6-12 (Buros, 1978). The test consists of three scales: vocabulary, comprehension, and reading rate. There are 120 items on the test with the score determined by the total number of items correct. High, middle, and low ability students are commonly identified in terms of scores ranging from 120-81, 80-41, and 40-0, respectively. The test has an estimated alternate form reliability for vocabulary between r = .82 to .91, comprehension r = .68 to .74, and reading rate r = .54 to .66. Concurrent validity estimates with other unspecified tests range between r = .44 to .83. Reading is one type of general skill that is required in many vocational programs. Therefore, teachers should have access to reading test results to estimate the reading level of the students enrolled in their vocational programs. However, the types of reading requirements may be quite different in various vocational programs.

The Social Classification System

The social classification system defines normality as appropriate

role performance according to social status. The behavior of a student is estimated by assessing the degree of interaction with others (Seitz and Geske, 1977).

Adaptive behavior has been considered to be an importnat factor in the social classification system (Leland, Nihira, Foster, Shellhaas, and Kagan, 1966; Blackman, 1972, McAllister, 1972; Wilson, 1972). The adaptive social behavior is expressed by the degree to which subjects are able to function and maintain themselves independently, and the extent to which they satisfactorily meet the culturally imposed demands of personal, and social responsibility (Heber, 1961). Adaptive behavior is a composite of many aspects of behavior such as intelligence, affective, motivational, social, motor, and a function of a wide range of specific abilities and disabilities.

The Vineland Social Maturity Scale is sometimes used to classify students according to social attributes (Anastasi, 1976). The scales are developed primarily for children between ages 0-12, but scales are available for individuals up to 25 years old. The scale provides a definite outline of detailed activities with respect to which children demonstrate a progressive capacity for looking after themselves, and for engaging in those activities which lead toward ultimate independence as adults. The items of the scale are arranged in order of increasing difficulty, and represent progressive maturation in self-help, self-direction, movement, occupation, communication, and social relations. The maturation in social independence may be taken as a measure of progressive development in social competence. The instrument has estimated retest reliability between r = .94 and .99. Validity has been estimated by comparing "normal" individuals with retarded individuals according to age and comparing the scale scores of learners with independent judgements of observers who are familiar with both groups of subjects. The concurrent validity estimate obtained using this procedure is r = .92. However, this scale was last normed in the 1940's and many of the items may be obsolete. Currently, its relevance to vocational education is questionable. While the Vineland Social Maturity Scale lists several kinds of functional activities individuals need to perform in daily living, it has not been demonstrated to have any application to vocational education for identifying learners who may have problems succeeding in or adjusting to vocational programs.

Summary

The major strategies, tests or procedures used to classify and diagnose students are considered to have limited utility for identifying students who may have difficulty succeeding in a vocational education program. The medical classification system offers tests, and procedures for diagnosing individual students according to pathological diseases or disorders which may yield information for understanding a learners' particular handicap or disadvantage.

The medical classification can lead to differentiated treatment and service, give more insight to etiology and prevention, and focus attention on specific disorders. The medical system can also be used as a means for beginning a classification, diagnoses, and treatment sequence which is specifically designed to counter-balance particular identifiable negative conditions (Gallagher, 1976). It probably has its best application for severely handicapped youth and adults.

However, the medical model could also be used to sustain a "social hierarchy" by keeping students from educational opportunities, and delay needed social change. The medical classification system assumes that behaviors which deviate in a negative direction from "normative" standards is a reflection of a personal illness or disease, disturbance, disorder, or dysfunction, and behavior that has been classified as deviant must be changed within the student by a curative process (Reger, 1972).

The statistical classification procedure uses several different kinds of standardized psychological tests, and procedures to classify students on various attributes based on their position on a normal distribution. Intelligence tests and developmental scales commonly classify students according to their intellectual abilities. Although the intelligence tests reviewed have some reliability and validity information to support their intended use, the tests have only a limited and indirect application to the content of vocational programs. Intelligence tests usually require standardized administration, interpretation, and scoring procedures, and are also expensive and time consuming to administer. The test results are typically not used directly by vocational teachers, but are often available to teachers for specific students.

General achievement test batteries, diagnostic and criterion referenced tests classify students according to their measured achievements or

aptitudes. The tests reviewed have some supportive reliability and validity information. However, because these kinds of tests were frequently not standardized on vocational populations, their relationships to vocational students and programs may be limited. The tests require standardized administration, interpretation, and scoring procedures, and are expensive, and time consuming for schools to administer. The results of these tests may be used for guidance purposes or provide teachers with some evidence of the ability ranges of students in their classes, but may not be related to the skills or content of the vocational program.

The social classification system may offer information which may be able to assess the ability of a student to function and maintain themselves independently. The system may also describe the extent to which students are able to meet the personal and social responsibility demands of society. However, the tests used to classify students based on social attributes seem to have minimal relationship to the ability of a student to succeed in a vocational program.

Generalizable Skills Studies

Several studies have been conducted on the generalizable skills required of workers and students in various occupations and vocational programs. (McKinlay, 1976; Altman, 1976; Sjogren, 1977, Stump, 1978). Lack of proficiency of generalizable skills may be a serious detriment to the educational, and occupational success of some student/workers, since vocational students frequently do not possess basic proficiencies in these types of skills. Vocational programs also often require high degrees of proficiency in such skills in order for students to function, and experience success within a vocational program. The functional diagnosis of the learning abilities and disabilities of students may, therefore, best occur within the framework of generalizable skills as they relate to the requirements of different vocational programs.

Wiant (1977) has developed a list of occupationally relevant, generalizable skills from responses of participants at a conference. The skill areas included: intelligence, aptitudinal, interpersonal, and attitudes. Items within each skill area were listed in the appropriate order of frequency. The items were stated in very general terms, and appear to have only

limited application for vocational education.

In an earlier study, Altman (1968) described a domain of general vocational capabilities through a content and face validation process while suggesting methodological improvements in the derivation of educational goals. A sample of 31 occupations was selected from the DOT with associated tasks identified for each occupation. A random sample of tasks was selected for each occupation with multiple choice questions written for each task. Tests were administered to approximately 10,000 ninth grade through junior college technical students in two different school systems. Sex differences emerged on the generalizable skills tests which may suggest that vocational content might be arranged along "some underlying continuum such as male and female skills showing occupations in which both male and female students possess similar skills." The skill areas and tests which evolved through factor analysis were: Mechanical (tools, mechanical systems, measurement and measuring instruments, stationary equipment operation, vehicular operation, connections and fittings, and fluid systems), electrical (electricity), spatial (layout and visualization, and structures), chemical-biological (materials, chemicals, foods and cooking, biological systems, medical, and first aid), symbolic (arithmetic conventions and clerical), and people (human relations, sales, dealing with situations, service etiquette, style, and grooming).

Probably the most comprehensive attempt to classify occupations according to generalizable skills was represented by the third edition of the Dictionary of Occupational Titles (DOT) (U. S. Department of Labor, 1965). The worker trait groups were developed by grouping the jobs into 22 general areas according to commonalities on educational requirements, vocational preparation, aptitude, interests, temperaments, and physical demands. The 22 general areas were further expanded into the 114 worker trait groups. Each occupational title has a 6-digit code number. The last three digits indicate the way in which the job requires a worker to deal with data, people, and things. Each digit describes the skills or categories of skills that are the central elements of the job. These do not reflect all the ways workers may deal with data, people, and things, but only those which are required for successful performance. They also do not reflect other job characteristics such as the relative amount of

time spent dealing with data, people, and things.

The Ergometrics Project (Cunningham, 1971) was concerned with identifying generalizable skills across occupations through a content and face validation process. The basic concept of the project included the ideas originally developed by Fine and Heinz (1958), Guilford (1966), McCormick, Cunningham, and Thornton (1967), and Altman (1968). Ergometrics uses the principles of psychomotor concepts to study the concept of generalizable skills (Cunningham, Tuttle, Floyd, and Bates, 1971). Work elements (work activities or conditions) and worker attributes (abilities and personality traits) are inherent in the project (Cunningham, 1971). The Occupational Analysis Instrument (OAI) (Boese and Cunningham, 1975) was developed to evaluate occupations in relation to their work elements. The OAI contains 622 work elements which were tested on 1414 occupations. The Attribute Requirement Inventory (ARI) (Neeb, Cunningham, and Pass, 1971) was then developed to evaluate the attribute requirements of an occupation. The ARI contains 103 human attributes. Cunningham (1975) identified the attribute requirements for each of the 62 work elements. The judges rated the level of relevance of an attribute to a work element on a 6-point scale. A rating of 0 indicated no relevance of an attribute to a work element and a rating of 6 was considered very relevant. The results of the present ongoing research concluded that only a vague and gross measure of generalizability exists across several occupations.

Smith (1975), Kawula and Smith (1975), and Smith (1977) described a study to identify generic skills which are generalizable across many occupations using a content and face validation process. Data were collected from approximately 10 employers in each of 77 nonprofessional occupational fields to identify the generalizable skills required of workers within these occupations. Thirty-one of the occupations contained supervisory tasks and were classified as supervisory occupations. The other 46 were classified as nonsupervisory occupations for which vocational programs typically provide education and training.

The skill areas of mathematics, communications, interpersonal relations, and reasoning were included in the occupational survey. The manipulative skill areas were not studied. The project used the data, people, and things taxonomy of the DOT to classify skills. The skill areas of mathematics and communications included items in which workers dealt

with data. The skill area of interpersonal relations included items in which workers dealt with people. The skill area of reasoning was a separate category.

The 192 skills were identified as common to several occupations and were categorized as (a) supervisor skills and non-supervisory skills. For a skill item to be considered generalizable, it had to be in common with 75% of the occupations sampled.

The Generic Skills Project represented an extensive research effort to provide the level of specificity of common skills not found in the DOT. The results of the project concluded that possessing the skills identified in the study would not guarantee occupational success, but a lack of proficiency in the skill areas would be a serious detriment to job success in many occupations.

Several investigators have reported program, sex, and aptitude differences when measuring general skills or abilities. Strasberg and Donlon (1975) found that males scored higher than females on mathematics tests. Macoby and Jacklin (1974) found that females have a verbal superiority in comparison to males. Eisenberg (1975) found that performance on general skills or ability tests was related to reading ability when IQ and sex were controlled. However, sex accounted for insignificant differences.

Pucel, Nelson, and Mohamed (1972) found program, sex, and aptitude differences when general abilities were measured for vocational students. However, sex was frequently confounded within many programs. For example, a welding program which may be male-dominated and a clerical program female-dominated would be confounded by sex if both male and female students were enrolled. An attempt to compare programs by sex, could not determine if differences were due to program or sex. Control for program and sex could only be possible if programs had a balance of males and females or if the data were analyzed separately. Their recommendation was that the analysis of such confounded variables be analyzed carefully to control for relevant program, and sex differences while accounting for differences in ability.

Summary

Several studies have investigated the concept of generalizable skills

which exist across vocational programs or occupations. Many of the studies reviewed suggest that generalizable skills often are stated in very general terms and lack relevance to vocational education.

However, the Generic Skills (Smith, 1975) Project was an extensive effort to identify generalizable skills across a wide range of occupations which appeared applicable to vocational training. The skills identified were at a level of specificity and generalizability not achieved in other studies.

Program, sex, and aptitude differences have been reported in many generalizable skills investigations. However, it is difficult to compare vocational programs which are confounded by sex. Analysis of such variables should be undertaken carefully to control for possible differential effects of program, sex, and abilities.

Student Self-Ratings and Teacher Ratings of Students

Investigators have studied student self-ratings and have found them to be an adequate assessment technique (Louney, 1974; Smith, 1976; Butler, 1976; Flaherty, 1978). However, accurate self-ratings are dependent upon external stimuli (Speidel, 1975). Systematic response errors in self-ratings can bias estimates of the reliability and validity of the measures and lead to biased estimates of the relationship to other variables (Wyner, 1976).

Several studies have attempted to assess whether test interpretation and counseling affect student self-ratings. Johnson (1953), Robertson (1959), Fernald (1964), Lister and Ohlsen (1965) reported a substantial increase in the accuracy of student self-ratings following test interpretation and counseling. However, this increase tends to diminish over time.

Berdie (1954) and Froelich (1954) found little change in the accuracy of student self-ratings following test interpretation and counseling. Froelich and Moser (1954) reported that students who scored higher on ability measures underestimated themselves on self-ratings and those who scored low on ability measures overestimated themselves on self-ratings. They indicated that this could be caused by regression toward the mean.

Shrauger and Terbovic (1976) found that high self-esteem subjects perceived themselves as doing better on tasks than low self-esteem subjects,

although their performance was actually comparable. The two group evaluations differed only when they thought they were assessing themselves and not when they were assessing someone else.

Several studies have also been conducted to determine if some students are better able than others to make accurate self-ratings of skills or abilities. Sex differences on student self-ratings have been reported in some investigations (Kaufman, 1973; Tivnan and Pillemer, 1978). Crandall (1969), and Lacher and Lacher (1975) reported that female students underestimated future performance on intelligence and academic tasks while males tended to overestimate themselves on these same tasks. Other studies have found little relationship between student self-ratings of abilities and aptitudes (Tierney and Herman, 1973; Pohlman and Beggs, 1974; Kelso, 1977). Many studies contained small sample sizes which were often totally male and did not consider age or sex as relevant factors. Other studies have reported relationships between student self-ratings of abilities and measured aptitudes (Berdie, 1951; Touhey, 1971; Tuck, 1972). Of the studies conducted, the results were conflicting making the evidence about the accuracy of self-rating inconclusive (O'Hara and Tiedeman, 1959; Hall, 1963; Bartlett, 1968; Bailey and Bailey, 1971; Bailey and Shaw, 1972; Yussen and Levy, 1975).

Relatively few studies have investigated the relationship between measured and self-estimated abilities to determine if the more informal mode of assessment is a reasonable technique to use. Hodgson and Cramer (1977) used sex and ability as factors to determine the relationship between student self-ratings and measured abilities. They found little support to suggest confidence in student self-ratings as a primary measure of abilities. The relatively small sample size may have affected the results of this study. However, they found that students were able to assess their own abilities in areas with which they have had much experience. They reported several tangible benefits of student self-ratings. Students are allowed to explore their interests in vocations and relate their self-ratings to occupational fields. The students are able to talk about and analyze their self-assessment. They can explore the results of prior aptitude and ability testing. Students can also relate what they learned in real life situations,and their curricular accomplishments in terms of the abilities required to achieve in their educational programs. The

investigators suggested that more concurrent validity studies of student self-ratings need to be conducted. Also systematic research needs to be conducted to examine, and improve the utility and validity of biographical and self-ratings information (Baird, 1976).

Several investigations have concluded that teachers are able to accurately assess the aptitudes or abilities of their students (Franke, 1974; Gonzalez, Bastos, Schaefer, and Michael, 1977). Teachers also utilize observational techniques which allow them to become very familiar with the abilities of their students. Therefore, teachers may be in the best position to assess the capabilities and limitations of students within their classrooms.

Sex differences in terms of teacher ratings of the skills and abilities of the students have been the focus of several studies. Good, Sikes, and Brophy (1973), and Donovan (1973). They found that teacher ratings were unrelated to the sex of the student in terms of skills and abilities. However, evidence exists that teachers have differing ideas of the skills and abilities possessed by male and female students (Freshbach, 1969; Lambert, Yackley, and Hein, 1971; Levitin and Chananie, 1972; Ricks and Pyke, 1973; Lee, 1973; Hansen, 1977). Teachers seem to know more about individual male students and their skills and abilities than they do about female students (Jackson and Getzels, 1959; Jackson and Laladerne, 1967; Jackson, 1968).

Standardized tests of abilities and the data which they reveal have been a source of controversy over the past several years (Perrone, 1977). Standardized tests can yield the "Pygmalion Effect" by which teachers consciously or unconsciously may base their expectations for a student on the basis of their knowledge about the standardized test score of a student. (Newkirk, 1975). Pedulla (1977) reported that knowledge of standardized test results reduced the teachers' ratings of the abilities of a student. However, Pedulla (1976), and Oliver and Arnold (1978) found that teacher judgments of student intelligence and achievement were not significantly affected by prior knowledge of the standardized test scores of students. In other studies, knowledge of standardized test results tended to raise, rather than lower teacher ratings of the performance of their students (Airasian, Kellaghan, Madaus, and Pedulla, 1977).

Summary

Traditional procedures used to classify students have relied on various standardized psychological tests. These tests frequently are expensive and time consuming to administer to students and often have little direct relationship to the content or standards of vocational programs. Also the reliability and validity information obtained from these devices are questionable since they were not normed on vocational students. For these reasons, standardized test data appear to have limited and indirect uses for vocational teachers to identify students who may have difficulty learning the content of their vocational program.

The Generic Skills Project identified a comprehensive list of generalizable skills which are potentially related to the success of students in vocational programs and to workers in various occupations. Lack of proficiency of generalizable skills such as mathematics, communications, interpersonal relations and reasoning have been reported to be detrimental to educational and occupational success. Vocational programs may frequently require high degrees of proficiencies in these skills in order for students to function and experience success in the program. Therefore, functional diagnosis of the learning problems of vocational students may appropriately be assessed by identifying the generalizable skills of students while accounting for program, sex, and aptitude differences.

Students are not usually given the opportunity to assess their own learning needs and abilities, although self-ratings have been found to be a viable assessment technique.

It has been suggested that vocational teachers may be in the best position to assess the functional learning problems of the students enrolled in their classes. They are subject matter experts who are familiar with the requirements/standards of their specific programs. Reliable and valid teacher ratings of student abilities may be possible if variables such as sex, ability, and type of program are considered.

CHAPTER III

RESEARCH DESIGN AND METHODOLOGY

Rationale

The review of literature has suggested that several instruments have traditionally been used to classify students according to various learner attributes. Some of these instruments are based on diagnostic procedures which may or may not be reliable and valid for the vocational student populations. Almost all of them result in assigning various labels to students on the basis of ability or aptitude indicators. The label potentially creates a stigma for the student, and teacher responsible for the education of the student. Most of this type of activity is prominent at the elementary or secondary school levels with the expectation that testing for the early identification of student learning problems will assist in making suggestions for remediation and/or for appropriate teaching/learning program modifications for the students.

Relatively few studies have attempted to specifically study classification and diagnoses of the important skills necessary for post-secondary vocational students to succeed in programs of their choice. Therefore, it was necessary to seek an alternative strategy by which post-secondary vocational teachers could have access to reliable, valid, and practical instruments which may have the potential for identifying students with learning problems functionally related to the vocational class in which they are enrolled. The instruments should reflect a relationship between the type and/or amount of skills necessary for each student to successfully learn the performances and knowledges required for succeeding in a particular vocational program.

The rationale for this study suggests that: (1) generalizable skills can be identified and judged as common to a number of different vocational programs, (2) student self-ratings and/or teacher ratings of students may represent a feasible, practical way to assess the types and/or amount of skills possessed by students who are enrolled in a vocational program, and (3) any attempt to determine the reliability or validity of instruments must necessarily account for differences in the type of vocational programs, sex, and the aptitudes of the student.

Purpose of the Study

The purpose of this study was to provide students and teachers with practical instruments and procedures which are capable of measuring the generalizable skills which are perceived as necessary for students to possess in order to succeed in post-secondary vocational programs. The major research problem was to determine the feasibility, reliability and validity of the student self-ratings and teacher ratings of student on an instrument designed to assess the generalizable skills believed to be necessary for a student to succeed in a vocational program. If the instruments are sufficiently reliable and valid, they eventually could be used by teachers or school personnel for identifying post-secondary vocational students who may have some functional learning disability which may prohibit them from succeeding in and/or completing a vocational program.

Objectives of the Study

The study was based on three major objectives pertaining to the reliability and validity of the student self-rating and teacher ratings of the generalizable skills necessary for students to possess in order to succeed in a vocational program.

I. To determine the reliability of the student self-ratings of generalizable skills and the teacher rating of the generalizable skills of students as estimated by (a) Cronbach's test of internal consistency and (b) test-retest reliability.

II. To determine the correlation (concurrent validity) between (a) the student self-rating of generalizable mathematics and communication skills and their respective standardized mathematics and reading aptitude scores and (b) the correlation of the teacher rating of the generalizable mathematics and communication skill of students in their classes and the respective standardized mathematics and reading aptitude scores of each students.

III. To determine the construct validity of the student self-ratings and teacher ratings of the generalizable skills in terms of the sensitivity of the ratings to discriminate among (a) program type, (b) student mathematics aptitude differences, and (c) student reading aptitude differences.

Each of the three objectives relate to the student self-ratings of generalizable skills and teacher ratings of the generalizable skills of the students while testing or controlling for differences in (1) sex of the

student, (2) type of vocational program, (3) mathematics aptitude of the student, and (4) reading aptitude of the student.

Research Design and Control Variables

A concurrent, validity, research design was developed to assess the reliability, concurrent and construct validity of the student self-rating and teacher ratings of the generalizable skills of the students in their class while controlling for four other concurrently related variables. The reason this is referred to as a concurrent validity design, is all student and ratings were obtained during the same time period as the control variables. This research design provided the opportunity to test the three major objectives of the study while also controlling for and/or testing the effects of programs or other modifying variables.

Figure 1, shows a conceptual diagram of the research design, together with the three objectives of the study. Figure 2, shows the relationship of the three objectives for the student and teacher ratings of generalizable skills and the four additional program and modifying control variables.

Rationale and Operational Definitions

The rationale for this design suggests that (a) students are probably in a knowledgeable position to provide a self-report on the degree to which they possess certain generalizable vocational skills believed to be related to the content of a vocational program and (b) teachers are also in the next most knowledgeable position to indicate the degree to which each student needs these skills to learn the content of their vocational program. It is, therefore, reasonable to expect that if both the student self-ratings of generalizable skills and the teacher rating of the generalizable skills of students in their class have high reliability, then there should also be a positive relationship between student and teacher rating for different vocational programs, for male/female students and for students who are known to have different levels of reading and mathematical aptitude as measured by standardized tests.

Based on this rationale, it is then possible to test the reliability and validity of the student self-ratings and the teacher rating of students on an instrument designed to assess the generalizable skills necessary for students to achieve success in a vocational program of their choice.

RESEARCH DESIGN

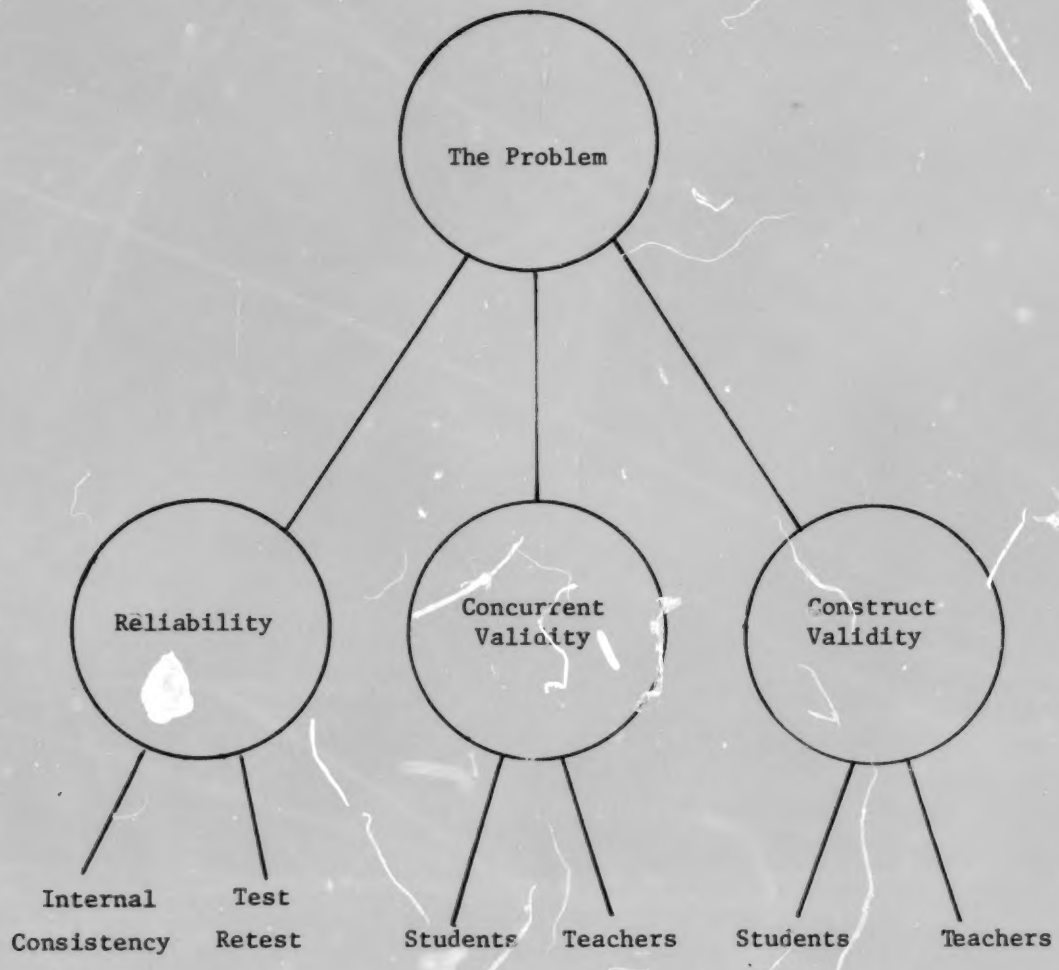

Figure 1

Research Design: Generalizable Skills Study

	Initial Administration population (n = 161)		Test/Retest (20% sample) population (n = 52)	
	Student self-rating	Teachers ratings of students	Students self-rating	Teacher ratings of students
Objective 1 Reliability	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores
	Student self rating	Teachers ratings of students	Students self-rating	Teacher ratings of students
Objective 2 Concurrent Validity	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores
	Student self rating	Teachers ratings of students	Students self-rating	Teacher ratings of students
Objective 3 Construct Validity	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores	1. Sex 2. Program type 3. Standardized mathematics test scores 4. Standardized reading test scores

Figure 2

The concept of reliability was tested in three ways for both student self-report and the teacher assessment of students. First, Cronbach's alpha was used to test for the internal consistency of (a) total student self-rating and (b) total teacher rating of students. Second, test-retest reliability was estimated by computing Pearson Product Movement correlations between the (a) first and second administration of the student self-ratings instrument and (b) between the first and second administration of the teacher ratings of students. Third, in addition to the two previous tests of reliability, tests of internal consistency and test-retest reliability were computed for student and teacher ratings of students by (a) sex, (b) vocational programs, and (c) standardized mathematics and reading aptitude scores of the students. The purpose of this was to demonstrate that the student self-ratings and teacher ratings were equally reliable for (a) male and female students, for each vocational program, and for students who are known to have different levels of abilities.

Concurrent validity was estimated by the degree of correlation between (a) the student self-rating of generalizable mathematics skills and communication skills, and their respective standardized mathematics and reading aptitude test scores and between (b) the teacher ratings of the generalizable mathematics and communication skills of students and the respective standardized mathematics and reading aptitude test scores of the students in their class. It was hypothesized that if there was a high degree of agreement between the student ratings of generalizable mathematics skills and communication skills and their respective standardized mathematics and reading aptitude scores, a reasonable case could be made for the concurrent validity of these scales. Similarly, if the teacher ratings of the generalizable mathematics skills and communication skills of students in their program were related to or consistent with the known level of standardized mathematics and reading aptitude scores of the students, then a similar case could be made for the concurrent validity of the teacher rating of these scales. The extent to which the correlations are low or accounted for relatively little of the variance between the two sets of measures for either students or teachers is the extent to which the concurrent validity of the ratings would be questionable and the use of generalizable skills instrument in this manner may be suspect.

The objective pertaining to construct validity was concerned with the

relative sensitivity of the student self-ratings and teacher ratings of students on the generalizable skills instrument. The construct suggests, that if student self-ratings and teacher ratings of the generalizable skills of students are valid, the mean score ratings of both students and teachers may be sensitive to differences in the (a) sex of the student, (b) type of program in which they are enrolled, and (c) differences in the standardized mathematics and reading aptitude scores of students. That is, if the ratings are valid, students known to have high, average and low standardized test scores in mathematics and reading should also produce similarly high, average, and low self-ratings on the test of generalizable skills, with similar results for teacher ratings of students. On the other hand, if there are no differences in the mean score ratings of students or teachers in terms of male/female students, different types of vocational programs or differences in mathematics or reading aptitude scores, it would cast serious doubt on the construct validity and sensitivity of both student and teacher ratings on the generalizable skills instruments. Ideally, neither student or teacher ratings should be different for male or female students or for different vocational programs, but they should be sensitive to aptitude differences if the construct and instrument is valid and useful.

Data Analysis

Both descriptive statistics and inferential tests of significance were conducted to test the reliability and validity of the student self-ratings of generalizable skills and the teacher ratings of the generalizable skills possessed by students in their classes. All statistical analysis were conducted using the Statistical Packages for the Social Science (SPSS) (Nie, Hull, Jenkins, Steinfienner, and Bent, 1975).

However, because inferential statistics were used in the study, it was necessary to a priori test some of the assumptions related to the use of inferential statistics: (a) homogeneity of variances of the rating and (b) normality of the distribution of the ratings. Hartlets' test (1940, 1950), and Kirk (1968) was used to test for significant differences in variances which may depart from equality and normality. These tests were conducted for both student self-ratings and teacher ratings of students for (a) male/female students, (b) students enrolled in different types of

vocational programs, and (c) students known to have different mathematics and reading aptitudes scores. All of the student self-ratings and teacher ratings were not significantly different from each other, nor were the ratings different for male female students, program differences or aptitude differences. The assumptions of normality and homogeneity of variances were therefore reasonable and justified the use of the inferential statistics to further test the objectives of the study.

Instrument Development

The final student self-ratings and teacher ratings of generalizable skills instrument was developed according to a pre-specified, logical plan involving four phases. Phase I involved the identification of 102 generalizable performance tasks derived from the Kauwsala and Smith (1975) study of Generalizable Skills for Non-supervisory Workers. Phase II involved the rewriting of these tasks in a language appropriate for post-secondary vocational students and teachers. Phase III involved obtaining responses to the 102 rewritten skill statements from a sample of vocational students and teachers. This procedure was to insure that the generalizable performance statements were (a) clearly written and meaningful, (b) relevant to vocational students and teachers. Based on the results of Phase III, wording and vocabulary changes were made in several of the 102 generalizable skills statements.

Phase IV involved the construction of the Generic Skills Importance Questionnaire for teachers. The purpose of this phase was to identify which of the 102 generalizable skill items were most important/critical to the success of students enrolled in each of five different vocational programs. Based on the ratings provided by the 18 participating vocational instructors, 81 performance statements were judged to be common to the five different vocational programs according to a 75% criterion of commonality. Stated another way, 81 of the original 102 generalizable skills were judged by 18 teachers to be common to the five different vocational programs used in the study. Appendix C shows the percentage ratings for each of the 102 original performance statements. The 81 common task statements are indicated with an asterisk. This procedure established both the face and content validity of the 81 generalizable performance tasks used to

develop a student self-rating instrument of generalizable skills and a companion teacher rating instrument of the generalizable skills believed to be important for a student to succeed in a vocational program.

The final instrument for assessing the generalizable skills of students consisted of a total of 81 items using a five point Likert scale. The student form of the instrument requested students to rate themselves on each of the 81 items as to the degree to which they possessed each generalizable skill. The teacher form of the instrument requested instructors to rate each student in their class as to the degree they believed each student to possess each of the 81 generalizable skills. Comparable data were thus provided by students and teachers on the 81 generalizable skills in each of the participating vocational programs. The instrument contained items related to the following four areas: (1) mathematical skills (15 items), (2) communication skills (27 items), (3) interpersonal skills (18 items), (4) reasoning skills (26 items).

Population and Sample

The population for this pilot study was the students and teachers at one Post-Secondary Area Vocational Technical Institute (AVTI), in Minnesota. Since this investigation was an initial study concerning generalizable skills, and only one school and five vocational programs were selected, the results of this study cannot readily be generalized to other populations or other vocational programs. However, the instruments and procedures are believed to be applicable to other schools, programs or populations.

Data regarding the number of programs and number of male and female students within each program, were obtained from the school. A purposive sample of five vocational programs was selected to participate in this study. The sample included students and teachers in two male-dominated programs, two female-dominated programs and one balanced program (program enrolling approximately equal numbers of male and female students). Programs with the largest enrollment were selected. The specific programs selected for the study included the students and teachers in the following five programs: auto mechanics, machinist, office occupations, interior design, and accounting.

Table 1

Programs, Teachers, and Students Who Participated in the Study

Program	Teachers n	Male students n	Female students n	Total students across programs n
Auto Mechanics	2	28	1	29
Machinists	3	31	0	31
Office Occupations	6	0	50	50
Interior Design	4	2	20	22
Accounting	3	13	16	29
Totals	18	74	87	161

n = sample.

Table 2

Number of Subjects who Participated in the Test and Retest Phase of the Study

	Number of subjects		Number of useable instruments		Percent of useable instruments	
	IT	RT	IT	RT	IT	RT
Teachers	17	5	161	39	100%	100%
Students	161	52	161	52	100%	100%

IT= Initial Test
RT= Retest

All teachers and students who were available at the time of the initial administration of the generalizable skills instruments participated in the study. Participating students were considered to be a representative sample of students enrolled in these programs.

This study included 18 teachers and 161 students enrolled in five different vocational programs. Seventy-four (74) students were male and eighty-seven (87) were female. Table 1 presents the programs, and number of teachers and students who participated in this study respectively. Data were analyzed only for the sample of teachers and students for whom complete data were available. Table 2 shows teacher-student participants in the test-retest phase.

Administration

The initial student and teacher instruments were administered to both students and teachers in each of the five vocational programs. A twenty percent random sample of teachers and students from each of the five vocational programs was selected for a test-retest sample using the same student and teacher generalizable skills instrument.

Findings

Objective I. To determine the reliability of the student self-rating of generalizable skills and the teacher rating of the generalizable skills of students as estimated by (a) Cronbach's test of internal consistency and (b) test-retest reliability.

The reliability coefficients for internal consistency and test-retest reliability were computed and are presented separately for the student self-ratings and the teacher ratings of students for (a) each of the three types of vocational programs, (b) sex, (c) level of standardized mathematics and reading test scores, and (d) the four subscales of the instruments and total instrument score.

Table 3 shows the coefficients of internal consistency for student self-ratings and teacher ratings of students for each of the three types of male-female dominated programs based on total instrument scores. Each of the three types of programs, regardless of the distribution of sex within the program produced reliability coefficients ranging from $r = .89$ to $r = .99$ for both student ratings and teacher ratings of students. Thus, it can be said that when student responses and teacher responses are

Table 3

Internal Consistency Reliability Coefficients (Cronbach's Alpha) of the Total Student Self-Ratings and Teacher Ratings of Students for the Balanced, Male-Dominated, and Female-Dominated Vocational Programs

	Balanced program (n=29)	Male-dominated programs (n=60)	Female-dominated programs (n=72)	Across all programs (n=161)
Student self ratings	.99	.99	.98	.98
Teacher ratings	.99	.99	.99	.99

aggregated for each of the three types of programs based on the distribution of sex within the programs, the data for students and teachers are equally reliable for the different types of male and female program membership.

Table 4 located in Appendix A shows the coefficients of internal consistency reliability for student ratings and teacher ratings of students on the generalizable skills instruments for the four scales and total score for students and teachers within each of the five different vocational programs selected for the study. The coefficients of reliability for both teachers and students for the four scales and for any of the five different vocational programs ranged only from a low of r = .89 to a high of r = .99. Based on these data, it seems reasonable to conclude that the student and teacher ratings of generalizable skills have high coefficients of internal consistency for each of the four scales of the instrument as well as for each of the five different vocational programs which represent male and female dominated programs and programs enrolling about equal numbers of male and female students.

Table 5 shows the coefficients of internal consistency for both student self-ratings and teacher ratings of generalizable skills for male and female students who were classified as possessing high, average, and low aptitudes in mathematics and reading. The rationale suggests that if the instruments are reliable, they should also be equally reliable for

Table 5

Test-Retest Reliability Coefficients (r) Of The Student Self-Ratings And Teacher Ratings of Students' Mathematics and Communication Skills For Male and Female Students Who Have High, Average, Or Low Mathematics and Reading Aptitudes

	Mathematics skills				Communication skills			
	Mathematics aptitude				Reading aptitude			
	High	Average	Low	Total	High	Average	Low	Total
Student Self-ratings								
Males	.76 n=10	.99 n= 5	1.00 n= 2	.83 n=17	.78 n= 7	-1.00 n= 2	.84 n= 8	.74 n=17
Females	.84 n= 6	.93 n= 6	.87 n=16	.86 n=28	.78 n=11	.93 n= 9	.94 n= 6	.83 n=26
Total	.77 n=16	.95 n=11	.89 n=18	.85 n=45	.71 n=18	.87 n=11	.90 n=14	.80 n=43
Teacher ratings								
Males	.81 n= 5	.00 n= 0	.00 n= 0	.81 n= 5	.89 n= 3	.00 n= 1	.00 n= 1	.81 n= 5
Females	.96 n= 6	.78 n= 6	.83 n=15	.84 n=27	.88 n=11	.92 n= 9	.85 n= 5	.85 n=25
Total	.87 n=11	.78 n= 6	.83 n=15	.83 n=32	.88 n=14	.91 n=10	.85 n= 6	.85 n=30

students and for teachers as well as for students who are known to differ with respect to differential mathematics and reading aptitudes.

The reliability coefficients for the self-ratings of both male and female students of high, average, and low aptitude in mathematics ranged from a low of r = .89 to a high of r = .98. All of the coefficients for the teacher ratings of male and female students of high, average, and low ability in mathematics ranged from a low of r = .95 to a high of r = .98.

In a similar manner, the self-ratings of male and female students of high, average, and low reading aptitude yielded reliability coefficients ranging from a low of r = .95 to a high of r = .97. Teacher ratings of male and female students of high, average, and low reading aptitude yielded reliability coefficients ranging from a low of r = .97 to a high of r = .99.

In general, it seems plausible to conclude that both the student self-ratings of generalizable skills and the teacher ratings of the generalizable skills of students produced high coefficients of internal consistency for (a) students and teachers in five different vocational programs for (b) male and female students and (c) for students who are known to have different levels of mathematics and reading aptitudes.

Reliability of the student self-ratings of generalizable skills and the teacher ratings of the generalizable skills of students in their class was also assessed in terms of stability or test-retest reliability. A 20% random sample of teachers and male-female students in each of the five vocational programs who participated in the initial test were selected to participate in the test-retest phase of the study. The two generalizable skills instruments were administered two weeks after the intial test data were collected. Students and teachers in the machinist program did not participate in the retest phase of the study.

Table 6 shows the Pearson Product Moment correlation between the first and second administration of the same instrument for students and teachers in the three types of programs in terms of the distribution of male and female students in each program. Test-retest reliabilities ranged from a low of r = .74 in the balanced male-female program to a high of .84 for male and female dominated programs with an average coefficient of r = .80 across all students in all programs.

Table 6

Test-Retest Reliability Coefficients (r) of the Total Student Self-Ratings and Teacher Ratings of Students Enrolled in Balanced, Male-Dominated, and Female-Dominated Vocational Programs

	Balanced program	Male-dominated programs	Female-dominated programs	Accross all programs
Student self-ratings	.74 n=11	.84 n=13	.84 n=28	.80 n=52
Teacher ratings	.89 n=11	--- n=0	.88 n=28	.88 n=39

Similarly, the test-retest coefficients for the teacher ratings of students enrolled in the three types of programs ranged from a low of r = .88 to a high of r = .89.

Table 7 shows the test-retest coefficients for the student and teacher instruments for (a) each of the four scales of the instrument (b) for each of the three types of vocational programs and (c) for the total across the three programs.

When viewing the aggregate totals for those programs, student test-retest coefficients ranged from a low of r = .67 (reasoning scale) to a high of r = .85 for the mathematics scale. Teacher ratings of students for the three programs yielded test-retest coefficients ranging from only a low of .81 to a high of .88.

When test-retest coefficients are viewed for student and teacher ratings for each of the four scales and total scores, instability of the retest data was evident. For example, both students and teachers ratings show low agreement on the ratings of the mathematics skills and reasoning skills between the first and second test administration in the accounting program. The coefficients for the other scales were all r = .74 or above.

Similarly, the test-retest for the students in the office occupations were quite different and low between the first and second administration of the test for interpersonal and reasoning skills. All other student

Table 7

Test-Retest Reliability Coefficients (r) Of The Student Self-Rating And Teacher Rating Scales And Total Instruments For Each Of Four Vocational Programs

	Accounting		Auto mechanics		Machinist		Office occupations		Interior design		Across all programs	
	SSR	TR	SSR	TR	SSR	TR	SSR	TR	SSR	TR	SSR	TR
	n		n		n		n		n		n	
	11	11	13	0	0	0	17	17	11	11	52	39
Mathematics	.27	.66	.94	--	--	--	.91	.89	.90	.47	.85	.83
Communications	.74	.94	.82	--	--	--	.89	.92	.81	.71	.80	.85
Interpersonal relations	.77	.87	.77	--	--	--	.61	.86	.92	.82	.75	.80
Reasoning	.68	.56	.60	--	--	--	.64	.87	.82	.82	.67	.81
Total	.74	.89	.84	--	--	--	.83	.92	.89	.89	.80	.88

SSR = Student Self-Ratings

TR = Teacher Ratings

and teacher ratings seemed quite stable between the first and second administration of the two sets of ratings (r= .74 or above) except for a r = .47 coefficient for teacher ratings of students in the interior design program for mathematics skills.

In general, it would appear that teachers are quite capable of producing more stable ratings of the generalizable skills of students in various vocational programs than are students. Student ratings of mathematics and reasoning skills were relatively unstable for students in the accounting program and interpersonal and reasoning skills were not stable for students in the interior design program. However, it should be noted that except for these few differences, the data for students and teachers were quite stable between the two administrations of the instruments indicating a reasonable degree of test-retest reliability.

Table 8 shows the test-retest stability of the data for teachers and for male and female students who were classified as having high, average, or low standardized mathematics and reading aptitude scores. The data show that several of the cells fluctuate from r = 1.00 to r = 0.00 because of either the small number of student or teacher ratings per cell or because there were no ratings in a particular cell. The purpose of this table is to demonstrate the extent to which test-retest data of generalizable skills are stable and reliable with respect to different levels of student aptitude in mathematics and reading.

Both ratings of male and female students of high, average, and low ability in mathematics appear to be quite stable. Where the number of students in each cell was sufficient, coefficients of stability ranged from a low of r = .76 to a high of r = .99. Similarly, the teacher ratings of high, average, and low ability mathematics students produced coefficients of stability which also appear to be quite stable. All coefficients for male and female students ranged from a low of r = .78 to a high of r = .96 for those cells in which there was a sufficient number of students.

Student and teacher ratings of students who have different levels of reading aptitude also produced coefficients of stability which were consistently high for student self-ratings of generalizable skill and for teacher ratings of the generalizable skills of their students for all three levels of reading aptitudes. That is, student self-ratings of generalizable

Table 8

Test-Retest Reliability Coefficients (r) of the Student Self-Ratings and Teacher Ratings of Students' Mathematics and Communication Skills for Male and Female Student Who have High, Average, or Low Mathematics and Reading Aptitudes

	Mathematics skills						Communication skills					
	Student self-ratings			Teacher ratings				Student self-ratings			Teacher ratings	
	Males	Females	Total	Males	Females	Total		Males	Females	Total	Males	Females	Total
High mathematics aptitude	.76 (n=10)	.84 (n=6)	.[illegible] (n=16)	.81 (n=5)	.96 (n=6)	.87 (n=11)	High reading aptitude	.78 (n=7)	.78 (n=11)	.71 (n=18)	.89 (n=3)	.88 (n=11)	.88 (n=14)
Average mathematics aptitude	.99 (n=5)	.93 (n=6)	.95 (n=11)	0.00 (n=0)	.78 (n=6)	.78 (n=6)	Average reading aptitude	-1.00 (n=2)	.93 (n=9)	.87 (n=11)	0.00 (n=1)	.92 (n=9)	.91 (n=10)
Low mathematics aptitude	1.00 (n=2)	.87 (n=16)	.89 (n=18)	0.00 (n=0)	.83 (n=15)	.83 (n=15)	Low reading aptitude	.84 (n=8)	.94 (n=6)	.90 (n=14)	0.00 (n=1)	.85 (n=5)	.85 (n=6)
Total	.83 (n=17)	.86 (n=28)	.85 (n=45)	.81 (n=5)	.84 (n=27)	.83 (n=32)	Total	.74 (n=17)	.83 (n=26)	.80 (n=43)	.81 (n=5)	.85 (n=25)	.85 (n=30)

skills produced coefficients of stability ranging from a low of only r = .71 to a high of r = .94. Teachers ratings of the generalizable skills for students of different levels of reading aptitudes also produced coefficients of stability that ranged from a low of r = .81 to a high of r = .92 in those cells where there were a sufficient number of students.

In general, it can be concluded that both the student self-ratings of generalizable skills and the teacher ratings of the generalizable skills of their students are quite stable for male and female students who possess different levels of mathematics and reading aptitudes. The stability of the student ratings and teacher ratings do not seem to be a function of the sex, aptitude, or type of vocational program in which the students are enrolled.

Objective II. To determine the correlation (concurrent validity) between (a) the student self-rating of generalizable mathematics and communication skills and their respective standardized mathematics and reading aptitude scores and (b) the correlation of the teacher rating of the generalizable mathematics and communication skill of students in their classes and the respective standardized mathematics and reading aptitude scores of each student.

The generalizable skills instrument for students and teachers consisted of 81 items which were divided into four separate subscales: mathematics skills (15 items), communications skills (27 items), interpersonal skills (18 items), and reasoning skills (26 items). For the purpose of testing the concurrent validity of the instrument, only the mathematics and communications scales were selected since they were judged to be most closely related to the standardized mathematics and reading aptitude test scores of the students. While this test of concurrent validity of only two of the four scales would not constitute validity for the 81 item generalizable skills instrument, it was perceived as at least a partial test of concurrent validity of the instrument.

Two separate tests were conducted to assess the concurrent validity of the generalizable mathematics and communication skills of the instrument. One test was to determine the degree to which the student self-ratings of their generalizable mathematics and communications skills were correlated with their respective standardized mathematics and reading aptitude test scores. (Reading aptitude scores were judged to be most closely

related to the communication skills items of the generalizable skills instrument. The second test similarly correlated the teacher ratings of the generalizable mathematics and communication skills of students in their class with the respective standardized mathematics and reading aptitude tests scores of each student.

The extent to which the student ratings of generalizable mathematics and communications skills are correlated with their respective standardized mathematics and reading aptitude scores, the two scales of the generalizable skills instrument can be said to have concurrent validity with the construct of aptitude measures. Similarly, if the teacher rating of the generalizable mathematics and communication skills are also correlated with the respective standardized mathematics and reading aptitude scores of the students in their classes, teacher ratings will have been shown to have concurrent validity with student aptitude measures. If the student and teacher ratings of generalizable skills are highly correlated with standardized test scores, then they may be very useful to teachers in identifying students who may have functional learning disabilities with respect to the mathematics and reading requirements of a specific vocational program.

This approach to testing concurrent validity was necessary because (a) no comparable standardized test of general aptitude existed for the students in the study and (b) it was necessary to establish a validated base from which to judge the validity of the student and teacher ratings of generalizable skills. It would not be possible to simply correlate student rating with teacher ratings since both could vary simultaneously, in unknown ways, and with no standards against which to compare the two sets of responses.

Table 9 shows the correlation coefficients for the student self-ratings of generalizable mathematics skills and their respective standardized mathematics aptitude test scores, together with the teacher ratings of generalizable mathematics skills of students in their classes with the respective standardized mathematics test scores of the students in their classes.

By looking at Table 9, it can be seen that seven of the correlation coefficients produced statistically significant relationships between student ratings of generalizable mathematics skills and their standardized mathematics aptitude scores. While most of the correlations were positive,

Table 9

Pearson Product-Moment Correlation Coefficients (r) Between The Student Self-Ratings Of Generalizable Math Skills And Their Ratings Of Generalizable Mathematic Skills And Standardized Mathematic Aptitude Test Scores Of Students For Three Types Of Vocational Programs

Student Self-Ratings of Mathematics Skills				
Math Aptitude	Balanced Program	Male Dominated Programs	Female-Dominated Programs	Across All Programs
High	r= .15 (n=22)	r= .16 (n=18)	r= .28 (n=8)	r= .19 (n=48)
Average	r=1.00* (n=3)	r= .45* (n=20)	r=-.02 (n=23)	r= .27* (n=46)
Low	r=0.00 (n=1)	r= .69* (n=16)	r= .14 (n=31)	r= .43* (n=48)
Total	r= .30 (n=26)	r= .55* (n=54)	r= .42* (n=62)	r= .51 (n=142)

*p < .05

Teacher Ratings of Students' Mathematics Skills				
High	r= .16 (n=22)	r= .02 (n=18)	r= .22 (n=8)	r= .12 (n=48)
Average	r=-.19 (n=3)	r= .28* (n=20)	r= .09 (n=23)	r= .18)n=46)
Low	r=0.00 (n=1)	r= .58* (n=16)	r= .49* (n=31)	r= .55* (n=48)
Total	r= .35* (n=26)	r= .53 (n=54)	r= .40* (n=62)	r= .52* (n=142)

*p < .05

the highest correlation (r = .69) accounted for less than 50 percent of the variances between the two measures of mathematics skills, indicating that more than 50 percent must be attributed to some other unknown source of variation.

Similarly, teacher ratings of the generalizable mathematics skills of their students produced seven statistically significant correlations between their ratings and the standardized mathematics aptitude scores of the students enrolled in three types of vocational programs. Statistically significant coefficients ranged from a low of r = .28 to a high of r = .58. This accounts for about 30 percent of the variances between the two measures indicating that 74 percent is due to some other unknown source of variances.

In general, while the correlations between the student self-ratings of generalizable mathematics skills and their respective standardized mathematics aptitude test scores were generally positive, the magnitude of the correlations suggests that the generalizable mathematics skills measured by the instrument appear to be quite different from the construct being measured by standardized mathematics aptitude test. The concurrent validity of the generalizable mathematics ratings of students and teachers is therefore not supported.

Table 10 shows the correlations between student self-ratings and teacher ratings of generalizable communication skills of students and the respective standardized reading aptitude scores of students and teachers respectively for three types of vocational programs.

The correlation between the student self-rating of generalizable communication skills and their respective standardized reading aptitude scores, produced only two statistically significant correlations (Total Score). While all of the correlations between student rating of communications skills and their reading aptitude scores were positive, correlations were generally low. This may in part be due to the small numbers of students in some of the aptitude by program categories.

Teacher ratings of the generalizable communication skills of students when correlated with the respective reading aptitude test scores of students in their class produced all positive correlations of which only three were statistically significant. This would seem to indicate that the teacher ratings of the generalizable communication skills of students are measuring some construct which is quite different from those measured in the reading

Table 10

Pearson Product-Moment Correlation Coefficients (r) Between The Student Self-Ratings Of Generalizable Communication Skills And Their Standardized Reading Aptitude Test Scores And Teacher Ratings Of Generalizable Communication Skills And Standardized Reading Aptitude Test Scores Of Students For Three Types Of Vocational Programs

Student Self-Readings of Communication Skills				
Reading Aptitude	Balanced Programs	Male-Dominated Programs	Female-Dominated Programs	Across All Programs
High	r=-.21 (n=13)	r= .03 (n=13)	r= .43 (n=17)	r= .17 (n=43)
Average	r= .44 (n=8)	r=-.31 (n=13)	r= .07 (n=24)	r=-.01 (n=45)
Low	r= .86 (n=5)	r=-.06 (n=25)	r= .24 (n=12)	r= .10 (n=42)
Total	r= .35* (n=26)	r= .02 (n=51)	r= .26* (n=53)	r= .20 (n=130)

*p < .05

Teacher Ratings of Students' Communication Skills				
High	r= .50 (n=13)	r= .33 (n=13)	r= .19 (n=17)	r= .31 (n=43)
Average	r= .36 (n=8)	r= .19 (n=13)	r= .19 (n=24)	r= .14 (n=45)
Low	r= .87 (n=5)	r=-.11 (n=25)	r= .59 (n=12)	r= .24 (n=42)
Total	r= .39* (n=26)	r= .18 9n=51)	r= .33* (n=53)	r= .33* (n=130)

*p < .05.

aptitude tests. This may in part be due to the relatively small numbers of students in several of the aptitude/program cells or it may be that generalizable communication skills are not, in fact, related to reading ability.

In conclusion, while both the student self-ratings and teacher ratings of generalizable mathematics and reading skills were generally positively correlated with the standardized mathematics and reading aptitude of students, the correlations were generally quite low and accounted for only a small amount of the variances between the two sets of ratings. Consequently, the generalizable skills of mathematics and communications for both student and teacher ratings lack the degree of concurrent validity necessary to place much confidence in these ratings. This further suggests, that these ratings may have limited use in identifying students who encounter difficulties succeeding in various vocational programs of their choice.

Objective III. To determine the construct validity of the student self-ratings and teacher ratings of the generalizable skills in terms of the sensitivity of the ratings to discriminate among (a) program type, (b) student mathematics aptitude differences, and (c) student reading aptitude differences.

The purpose of this objective was to determine if the student self-ratings and teacher ratings of generalizable skills produced differences between and/or among programs known to differ in terms of (a) the distribution of sex enrollment in each of the programs and (b) in terms of the students who were known to have different levels of standardized mathematics and reading aptitude test scores.

It was reasoned, that if the student and teacher ratings of generalizable skills were valid, then both student and teacher ratings should produce mean score ratings which are sensitive to differences where differences are known to exist in terms of the program/sex and in terms of aptitude differences. The extent to which the ratings of students and teachers are not sensitive to and/or inconsistent with these known differences is the extent to which the construct validity of student and teacher ratings of generalizable skills ratings are questionable.

Table 11 shows the average (ratings) on an 81 item generalizable skills instrument for both student self-ratings and teacher ratings of students enrolled in three types of vocational programs: male and female dominated and balanced programs in which about one half of the students

Table 11

Test of Sensitivity: Differences Among Male, Female and Balanced Programs in Terms of the Total Mean Score Ratings of Generalizable Skills for Student Self-Ratings and Teacher Ratings of Students

	Male	Female	Balanced	P	Range
Student	$\bar{X}$ 312	$\bar{X}$ 329	$\bar{X}$ 338	.042*	26
Teacher	$\bar{X}$ 296	$\bar{X}$ 327	$\bar{X}$ 342	.001*	46

were male and female. A one way analysis of variance was conducted to determine whether there were statistically significant differences among the mean score ratings of both students and teachers in the three types of sex dominated program enrollments.

There was a statistically significant difference in the ratings of male/female students in terms of the 81 items on the generalizable skills instrument. The P value was P = .042 which means a difference in mean scores as large as those shown (26 points) would occur by chance only four times in a hundred. The lowest average ratings were for male students (312), then female students (329) and the highest was for students in the balanced program (338). Ratings on the 81 item 5 point Likert scale could range from a low of 81 (all ratings of 1) to a high of 405 (all ratings 5).

Similarly, there were statistically significant differences in the teacher rating of students in the three types of programs (P= .001) indicating differences this large would occur by chance only one time in a hundred. The range of scores was 46 points with the male students being rated the lowest (296) the females next highest (327) and students in the Balanced program the highest of the three groups (342).

Based on these data, it can be concluded that both students and teachers rate the generalizable skills of male and female students differently and that students in the balanced programs (one half male and one

half female) produced the highest student and teacher ratings of the three groups. This may suggest that (a) students enrolled in male/female and balanced programs possessed different generalizable skills at the outset of the program and (b) male/females enrolled in balanced programs attract students of different aptitudes and that the ratings do in fact reflect these differences, or (c) the items of the instrument may be biased in favor of female students and are not as applicable to male students. In general, the results could reflect a program bias, aptitude program (sex) biases or an item/sex bias.

Table 12 shows the mean score student self-ratings and teacher mean score ratings of students in their class on a 15 item generalizable skill mathematics scale for students in three different types of programs and who were known to have different levels of mathematics aptitude as measured by the respective standardized mathematics test scores of each student. It was reasoned that if the ratings of students and teachers were valid, their ratings should be consistent with the known level of mathematics aptitudes of the students and type of vocational program (male/female dominated and balanced program).

There were statistically significant differences in terms of the mean score ratings of generalizable mathematics skills for (a) the three types of vocational programs ($P = .040$) and aptitude differences ($P = .001$) but no significant program/aptitude interaction was observed. This may suggest that students in the three types of vocational programs were rating their generalizable mathematics skills differently, but that their ratings appeared to be relatively consistent with their known level of mathematics aptitude within each of the three types of programs. That is, generally students who are known to have a high ability in mathematics rate their generalizable mathematics skills similarly high and students with average and low mathematics aptitudes rate themselves lower respectively. These findings are consistent for students in each of the three types of programs. Students of known high aptitude in mathematics in the male dominated program rate themselves proportionally higher than either the average or low mathematics ability level male students. The same can be said for students enrolled in female dominated and balanced programs.

In general, it can be concluded that male and female students who are known to differ in terms of their mathematics aptitude scores tend to rate

Table 12

Test of Sensitivity: Differences Among Types of Vocational Programs in Terms of the Mean Scale Score Ratings of Generalizable Mathematics Skills for Teachers and Students who are Known to have Different Levels of Mathematic Aptitudes

		Male	Female	Balances	Pb.	Range	Factors
Students	High	23.9	25.1	25.5	.040*	24	Program
	Average	23.2	24.0	25.5	.001*	35	Aptitude
	Low	19.2	21.7	20.9	.201	32	Program Aptitude Interaction
Teachers	High	23.2	25.7	25.7	.03*	25	Program
	Average	22.5	21.9	23.1	.001*	1.2	Aptitude
	Low	18.2	21.2	24.8	.201	6.6	Program Aptitude Interaction

their generalizable mathematics skills differently, but that their ratings are for the most part consistent with their known level of mathematics aptitude. This finding suggests that at least the ratings of generalizable mathematics skills are sensitive to differences in sex and mathematics aptitude where these differences are known to exist and appear to be consistent with these differences.

The teacher ratings of the 15 item generalizable mathematics skills for students in the three types of male/female programs are shown in the lower half of Table 12. There were statistically significant differences among the three types of male/female programs at the P = .03 level and among the three levels of mathematics aptitudes. There were no significant interactions between type of program (sex) and level of mathematics aptitude.

In general, it can be seen that teachers tended to rate the

generalizable mathematics skills of male students consistently lower than the teachers who rated students in the female dominated or balanced program respectively.

Similarly, teachers tended to rate the generalizable mathematics skills of students consistent with the standardized mathematics aptitude scores of the students regardless of the distribution of sex within the three types of programs.

It can be concluded that the teacher ratings of the generalizable mathematics skills of students are (a) different for male and female dominated programs, but (b) are consistent with and sensitive to differences in the level of mathematics aptitude for male as well as female students. Therefore, it can be said that while students and teachers in male and female dominated programs rate their generalizable mathematics skills lower and higher respectively, the ratings are consistent with and sensitive to known differences in level of mathematics aptitude regardless of the sex of the student or type of vocational program.

Table 13 shows the mean student and teacher ratings of a 27 item generalizable communication skills scale for students who were known to have high, average, and low reading aptitude as measured by standardized test scores.

The 27 item communication scale was selected because it was believed to be most closely related to the reading aptitude scores of students. If the student and teacher rating are valid, students enrolled in male/female dominated programs should produce mean score ratings which are consistent with their reading aptitude test scores. If ratings are not consistent, either the ratings cannot be perceived to be valid or that the ratings of communication skills are quite different from those measured by the standardized reading aptitude scores.

Table 13 indicates that there were no statistically significant differences in the mean score ratings of students on generalizable communication skills scale for students enrolled in the male/female dominated and balanced programs or for students who are known to have different levels of reading aptitude. Interaction between program and aptitude was also not statistically significant. In general, all students regardless of level of reading aptitude, rated their generalizable communication skills between a high of 12.7 and a low of 10.4. These ratings were not sensitive

Table 13

Test of Sensitivity: Differences Among Types of Vocational Programs in Terms of the Mean Scale Score Ratings of Generalizable Communication Skills by Teachers and of Students Who are Known to Have Different Levels of Reading Aptitude

	Reading Aptitude	Male	Female	Balances	P.	Range	Entp.
Student	High	11.6	12.6	12.7	.565	1.1	Program
	Average	11.9	12.4	12.3	.135	.5	Aptitude
	Low	11.4	11.8	10.4	.614	1.4	Program Aptitude Interaction
Teacher	High	11.3	13.0	12.6	.015*	.4	Program
	Average	10.9	11.9	12.7	.076	1.8	Aptitude
	Low	10.6	11.6	11.0	.704	1.0	Program Aptitude Interaction

to program/sex differences, or differences in the level of reading aptitude of the students. Ratings of generalizable communication skills apparently lack sensitivity to program differences and thus lack construct validity in light of the rationale developed for this instrument.

Teacher ratings of the generalizable communication skills of students are shown in the lower portion of Table 13. Statistical significance was evident for type of male/female dominated program at the P = .015 level and for student aptitude difference at the P = .076 level. Interaction of program and aptitude was not statistically significant at the .05 level.

While statistically significant differences were observed, the mean score ratings ranged only from a high of 13.0 to a low of only 10.6. These are not large differences, thus it may be concluded that while teacher ratings of communication skills of the students are more sensitive to

program and sex differences and to student reading aptitude scores than are student ratings, these differences were not large. In general, ratings of generalizable communication skills of students and teachers are not sensitive to program or differential reading aptitude differences and therefore lack construct validity in terms of the rational developed for this instrument.

Summary

In general, neither the student self-rating nor the teacher rating of students in their classes appear to show very much evidence to support the argument for the construct validity of generalizable mathematic skills or communication skills. While the student and teacher rating of the generalizable mathematic skills appear to be quite sensitive and consistent with known differences in the mathematic aptitude of students, there was not a great deal of support for the construct validity of the generalizable mathematics items. There was even less support for the construct validity of generalizable communication skills as a measure of reading aptitude. Neither student nor teacher ratings of generalizable communication skills were sensitive to or consistent with differences in levels of reading ability. There were, however, differences in male and female programs, but this may mean that female dominated programs attract students with higher reading aptitudes than male programs.

CHAPTER IV

LIMITATIONS, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

Limitations

The purpose of this study was to begin to develop a rationale, procedure and a set of instruments to assess the viability of using the concept of generalizable skills as a basis for identifying possible functional learning abilities or disabilities of students which may prohibit them from succeeding in a regular post-secondary vocational program. As is the case with most initial investigations designed to break new ground in previously uncharted areas, the study necessarily had limitations.

First the study involved only the teachers and students enrolled in one of five vocational programs in one post-secondary vocational school in Minnesota. Thus, the individuals who participated in the research study represented a purposive rather than a random sample of participants. As a result of this limitation, no attempt was made to generalize the findings beyond the sample. However, this does not suggest that the rationale, procedure and instruments used in this study could not also be used in other schools and with other populations.

Secondly, the study was limited because only the standardized test aptitude scores for students on the Basic Skills Arithmetic test and the Nelson-Denny reading test scores were available for students who participated in the study. It would have been better if test data on other standardized tests would have been available which more closely related to the concepts assessed by the generalizable skills instrument. This would have provided a more appropriate standardized data base to serve as a baseline anchor from which to judge the concept of reliability and validity of student and teacher ratings of generalizable skills.

Lastly, the assumption was made that students were capable of reading and understanding the items on the generalizable skills instrument and were capable of assessing the degrees to which they possessed each skill. Similarly, it was assumed that teachers were sufficiently familiar with the classroom performance of each student such that they were able to judge the degree to which students were perceived as possessing the generalizable skills necessary to succeed in the respective vocational program.

In summary, the purpose of the study was to begin a program of research pertaining to the potential application of the concept of generalizable skill ratings of students and teachers to identify possible functional learning disabilities of post-secondary vocational students. As a result of the research design, the population was limited to a relatively small purposive sample of students and teachers in one post-secondary school in Minnesota. Limited standardized test data were available for students to serve as baseline data to assess reliability and validity of student and teacher ratings. These limitations were perceived as practical limitations and do not necessarily limit the use of the procedures or instruments for identifying students with functional learning disabilities.

Conclusions

The conclusions of the study are based on the data presented and discussed for each of the three objectives and are interpreted in accordance with the rationale for and design of the study.

Reliability

1. Both the student-self ratings of generalizable skills and the teacher ratings of the generalizable skills of students in the vocational classes were equally reliable for (a) male, female dominated programs and programs having a balance of male and female students, (b) students known to have different levels of reading and mathematics aptitudes, (c) each of the four scales of the generalizable skills instrument and (d) each of the five separate vocational programs which participated in the study.
2. With only a few exceptions, the results of the test-retest reliabilities were the same as those produced by the coefficient of internal consistency. The self-ratings of students and the teacher rating of students were shown to have high test-retest reliability for (a) male and female students, (b) students known to have different levels of mathematics and reading aptitudes, (c) each of the four scales of the generalizable skills instrument, and (d) four of the five different vocational programs that participated in the reliability retest.

In general, it can be concluded that both the student self-ratings of generalizable skills and the teacher ratings of the generalizable skills of students were equally reliable for male and female students who were known to have different levels of mathematics and reading aptitudes and who were enrolled in one of the five vocational programs included in the study. The results of the test-retest were also shown in produce similar stability coefficients of reliability.

Concurrent Validity

1. The relationship between the student ratings of generalizable mathematics skills and their respective standardized mathematics aptitude scores were all quite low, although some correlations were statistically significant from zero,but usually accounted for less than 50% of the variance between the two measures. The concurrent validity of the generalizable skill ratings of students is not supported.
2. The ratings of the generalizable mathematics skills of students by their teachers systematically produced low correlations between the two sets of ratings, thus indicating that teacher ratings of mathematics skills lack concurrent validity in terms of measuring similar skills as those on the standardized mathematics aptitude test.
3. Both student and teacher ratings of generalizable communication skills produced low and nonsignificant correlations with standardized reading aptitude scores of students, thus indicating that the communication skills lack concurrent validity in terms of measuring a construct related to reading.

In summary, their appears to be a lack of evidence to suggest that the generalized mathematics skills and communication skills of the generalizable skills instrument are measuring the same constructs or skills as those included in the standardized mathematics or reading aptitude tests. Apparently, the mathematics skills and communication skills assessed by the generalizable skills instrument are assessing a construct different from and unrelated to standardized mathematics or reading aptitude. The argument for establishing the concurrent validity of these two scales of the generalizable instrument cannot therefore be made with any degree of confidence.

Construct Validity

1. The average ratings of students and teachers on the total generalizable skills instrument were statistically different for students in the male, female dominated programs and the programs balanced by the distribution of sex, thus concluding that male students rate their generalizable skills consistently lower than females or students in the program with sexual balance.
2. Both student and teacher ratings of generalizable mathematics skills produced statistically significant differences for male/female students, but were consistent with and sensitive to differences in levels of mathematics aptitudes of the students.
3. Both student and teacher ratings of generalizable communication skills were not statistically different for the male or female students nor were they different for or consistent with the differences in levels of standardized reading test scores of the students.

In summary, the student self-ratings and teacher rating of the generalizable skills of post-secondary vocational students appear to be quite reliable for male and female students who are known to have different levels of mathematics and reading aptitudes and who are enrolled in different vocational programs. However, there seems to be little relationship between the student self-rating or teacher rating of the generalizable mathematics skills or communication skills of students and their standardized mathematics or reading aptitude scores. This would tend to indicate that the generalizable mathematics and communications scales of the generalizable skills instrument (a) lack concurrent validity for students and for teachers and (b) that these two scales probably are measuring same construct quite different from that which is assessed by the standized mathematics and reading aptitude scores of students.

However, when comparing the mean score ratings of the generalizable mathematics and communication skills of student self-ratings and teacher ratings of students, the ratings were shown to be sensitive to (a) differences among the male/female and balanced programs and for students known to possess different levels of mathematics aptitude. The rating of the generalizable communication skills were not shown to be sensitive for students or teachers with respect to (a) type of male/female program

or (b) levels of reading aptitude. Apparently, the generalizable mathematics scale can produce ratings which are consistent with students known to possess high, average and low aptitudes in mathematics while the ratings of the generalizable communication skill of students or teachers are not sensitive to differences in (a) type of male/female program or to (b) levels of reading aptitude. The construct validity of these ratings are therefore questionable since these ratings are measuring a construct seemingly different from reading aptitude.

Implications and Recommendations

Based on the findings and limitations of the study, there appear to be several implications as well as subsequent recommendations for instrument revision and further research.

The implications and recommendations for the study take two forms: (a) suggestions for revising the instruments and/or the current research design and (b) recommendations for further research in the area of generalizable skills as they may relate to identifying students who may have functional learning disabilities which inhibits them from succeeding in a regular vocational classroom environment.

Recommendations of Existing Design/Instruments

Within the current design of the study and the instruments several improvements/revisions appear to be warranted.

1. The items for the student and teacher forms may require either revision, clarification or elimination. Apparently, the items pertaining to communication skills, do not discriminate very well for male or female students of different aptitudes, yet may be an important skill for success in vocational programs.
2. Different and more comprehensive standardized aptitude tests (GATB, DAT, others) should be identified and used to establish a more relevant, baseline, aptitude data for further validation of student and teacher rating of generalizable skills.
3. A greater variety of male, female dominated and balanced programs should be used in further assessing the reliability, validity and appropriateness of the procedures and instruments.

4. Greater control needs to be taken to more specifically account for differences in (a) type and content of vocational programs, (b) sex of student and teachers, and (c) aptitude differences in students.
5. Training sessions for the teachers and students should be conducted prior to administration of the instruments.
6. Test-retest procedures should be conducted at some convenient time when holidays, quarter/semester breaks or the ending of the school year are not relevant factors.
7. The directions for completing the student and teacher instruments should be reviewed to insure their accuracy, readability, and understanding.
8. School officials and teachers may wish to use the generalizable skills instrument not as an admissions screening device, but as a tool which has some potential for identifying students who may have a functional learning problem in some vocational specialties.

Recommendations for Further Research

In addition to the previous recommendations for instrument revision, it seems plausible, that additional research and validation studies could be conducted with other populations, in other educational settings and using more appropriate ways to control or account for differences in (a) sex, (b) levels of aptitude and (c) content of an educational/vocational program(s) and (d) age-socio economic status of the student. It therefore follows that areas for additional research may include but not be limited to the following areas:

1. Test the instruments with new and different age groups of students some of whom may be known to be handicapped/ disadvantaged and others who are known to be free of these conditions (e.g., secondary junior high or elementary students).
2. Test the instruments with other secondary post-secondary or adult populations currently enrolled in various vocational or practical arts programs, (e.g., agriculture, industrial arts, home economics, business, distributive, T & I, technical, health and others.

3. Identify more comprehensive and relevant aptitude measures for students, such that a base can be established for making estimates of validity and reliability.
4. Explore the feasibility of using multivarate techniques (multiple regressions, discriminate function, and others) to statistically control for differences in (a) sex, (b) program, (c) aptitude and (d) other relevant characteristics.
5. Readminister the instruments to other populations and establish face and content validity for the items relative to the content requirements of new and different educational programs.
6. Explore additional techniques or ways to assess the extent to which either students or teacher ratings of students either under or overestimate the capabilities of the student.
7. Explore alternative research designs (cross validation, repeated measure and multivarate) to more appropriately establish the external validity and reliability of student and/or teacher ratings of generalizable skills.
8. Refine the instruments in such ways that they can readily and realistically be used by teachers or school officials to identify individuals who potentially possess functional disabilities which are likely to prohibit them from succeeding in some educational/vocational environment.

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APPENDIX A

COEFFICIENTS OF INTERNAL CONSISTENCY FOR FIVE SEPARATE VOCATIONAL PROGRAMS

Table 4

Internal Consistency Reliability Coefficients (Cronbach's Alpha)
Of The Student Self-Rating And Teacher Rating Scales
And Total Instruments For Each Of The
Five Vocational Programs

	Accounting		Auto mechanics		Machinist		Office occupations		Interior design		Across all programs	
	SSR	TR	SSR	TR	SSR	TR	SSR	TR	SSR	TR	SSR	TR
	n		n		n		n		n		n	
	29	29	29	29	31	31	50	50	22	22	161	161
Mathematics	.95	.90	.94	.97	.99	.99	.93	.98	.88	.92	.94	.98
Communications	.95	.98	.92	.97	.99	.99	.97	.98	.93	.98	.96	.98
Interpersonal relations	.96	.95	.89	.98	.99	.98	.95	.97	.94	.97	.95	.97
Reasoning	.96	.98	.96	.98	.99	.98	.97	.98	.97	.99	.98	.99
Total	.99	.99	.97	.99	.99	.99	.98	.98	.97	.99	.98	.99

SSR = Student Self-Ratings

TR = Teacher Ratings

APPENDIX B

AVERAGE TEACHER RESPONSES OF THE IMPORTANCE OF 102 GENERALIZABLE SKILLS

Table 14

Average Teacher Responses of the Importance of 102 Generic Skills to the Content of their Vocational Program

	Mathematics Skills Item	Average
1.	Read, write and count whole numbers	.92
2.	Add and subtract whole numbers	.94
3.	Multiply and divide whole numbers	.89
*4.	Solve word problems with whole numbers	.67
5.	Round off whole numbers	.78
6.	Read and write fractions	.79
*7.	Add and subtract fractions	.71
8.	Multiply and divide fractions	.61
*9.	Solve word problems with fractions	.54
10.	Compute dollars and cents	.85
11.	Read and write decimals	.88
12.	Round off decimals	.81
13.	Multiply and divide decimals	.81
14.	Add and subtract decimals	.82
*15.	Solve word problems with decimals	.54
16.	Read and write percents	.86
17.	Compute percentages	.85
18.	Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals and decimals to percents	.76
19.	Solve problems using correct order of operations	.78
*20.	Solve word problems (mixed operations).	.58
*21.	Perform quick calculations for word problems.	.53

*Items below the .75 criterion were omitted from the student self-rating and teacher rating instruments.

Mathematics Skills

	Item	Average
*22.	Compute averages	.71
*23.	Read numbers or symbols from measuring scales	.74
*24.	Solve problems involving time	.68
25.	Use a calculator	.79
*26.	Perform basic metric conversions	.58

Communication Skills

	Item	Average
1.	Select, use, and identify words that mean more than one	.74
*2.	Identify, use, and write words by adding beginnings and endings to change their meaning	.65
*3	Make and use shortened forms of words using an apostrophe to create contractions.	.63
*4.	Make and use shorter forms of words	.69
5.	Use the dictionary	.76
*6	Use words which mean the same but are spelled differently	.61
*7.	Use words which are opposite of one another	.61
*8.	Use words which sound the same but are spelled differently	.64
9.	Understand the meaning of words in sentences	.86
10.	Use books to find information	.94
11.	Understand spoken communication	.94
12.	Interpret or give your explanation to spoken communication	.89
13.	Pronounce words correctly	.83

*Items below the .75 criterion were omitted from the student self-rating and teacher rating instruments

Communication Skills

Item		Average
14.	Use good word choices	.85
15.	Talk fluently	.82
16.	Organize ideas while speaking	.82
17.	Ask and answer the six w questions given a reading or speaking situation (what, where, why, when, who, and which)	.82
18.	Give directions or information	.88
19.	Use the telephone by finding names and telephone numbers in a telephone directory and yellow pages, and make local and long distance calls	.79
20.	Understand the word-for-word meaning in a reading passage	.76
*21.	Interpret or give your meaning to a reading passage	.72
22.	Read forms	.96
23.	Read short notes, memos, and letters	.89
24.	Read charts and tables	.89
25.	Read manuals	.93
26.	Write statements or phrases on forms	.76
27.	Write sentences on forms	.79
28.	Write sentences	.79
29.	Write memos	.75
30.	Take notes	.88

Interpersonal relations skills

Item		Average
1.	Use eye contact, attentive posture, gestures, while listening and speaking and appear relaxed	.88

*Items below the .75 criterion were omitted from the student self-rating and teacher rating instruments.

Interpersonal relations skills

Item		Average
2.	Identify behaviors which prevent good verbal communication	.76
3.	Understand the main idea in another's communication	.85
4.	Distinguish between fact and opinion in another's communication	.79
5.	Respond to others by asking questions	.85
6.	Restate what was said in a conversation	.78
7.	Confirm one's own understanding of a conversation	.85
8.	Pay attention to others nonverbal cues	.76
9.	Appear self-confident while communicating with others	.90
10.	Maintain one-to-one conversation	.88
11.	Maintain task-focused conversation	.79
12.	State a point of view	.81
13.	Maintain friendly conversation	.83
14.	Join in group discussion	.75
15.	Follow instructions or directions	.97
16.	Give instructions or directions	.92
17.	Give a demonstration of a skill	.89
18.	Identify people's need for instruction by asking or watching their performance on the job	.76

Reasoning skills

Item		Average
1.	Locate information about job duties, materials, and equipment	.94
2.	Locate information about job methods	.94
3.	Locate information about the proper ordering of procedures to perform a job	.92

Reasoning skills

Item		Average
4.	Recall ideas	.92
5.	Sort objects	.79
6.	Estimate the time required to perform regular duties on the job	.88
*7.	Estimate weight of various objects of different shapes, sizes, and makeup	.54
*8.	Estimate length, width, height, or distance between objects	.68
9.	Put work duties in proper order to complete a job	.88
10.	Set priorities for doing work	.90
11.	Set job goals	.96
12.	Determine activities to reach goals	.93
13.	Decide about ways to achieve goals	.94
14.	Set standards to measure the activities to meet goals	.83
15.	Set the order in which work must be done to reach a goal	.93
16.	Determine how a work activity will assist in reaching a stated goal	.85
17.	Select the materials, tools, equipment, and methods to perform work duties	.90
18.	Relate causes to problems in a simple work situation	.88
19.	Identify potential problems given a specific set of facts	.86
20.	Carefully examine possible methods to solve a simple problem situation	.86
21.	Ask questions to identify the problem	.94
22.	Use the senses of touch, see, smell, taste, and hear	.78
23.	Determine important information for problem solving	.92
24.	Arrive at several possible information statements or descriptions of a problem	.79

*Items below the .75 criterion were omitted from the student self-rating and teacher rating instruments.

Reasoning skills

Item		Average
25.	Select the best statement or description of a problem	.83
26.	Determine several possible solutions to a problem	.86
27.	Select a possible solution to a problem from a set of alternatives	.85
28.	Given a written plan, update or revise it using information or events that have occurred	.79

APPENDIX C

GENERALIZABLE SKILLS INSTRUMENT: TEACHER FORM

Generic Skills Teacher Rating Questionnaire

The purpose of this questionnaire is to determine for each student enrolled in your program area of instruction the level of proficiency with which you perceive he or she to have on each of the performance tasks listed below. You will need to complete a separate rating form for each student. Please provide the information requested and then proceed to read and follow the directions below for completion of the questionnaire on each student. Your cooperation is appreciated.

Teacher Name:_____

Student Name:_____ Sex: M_____ F_____

Program Area:_____

Directions: Indicate with a circle the level of proficiency with which you believe the student named above is functioning on each of the following performance tasks.

EXAMPLE	LEVEL OF PROFICIENCY NOT PROFICIENT		MODERATELY PROFICIENT		VERY PROFICIENT
Add and subtract decimals. (EX: .1 + .02 = .12, .9 - .6 = .3)	1	2	3	(4)	5

SKILL AREAS

MATHEMATICS	LEVEL OF PROFICIENCY NOT PROFICIENT		MODERATELY PROFICIENT		VERY PROFICIENT
1. Read, write and count whole numbers. (EX: 1, 2, 3, 4)	1	2	3	4	5
2. Add and subtract whole number. (EX: 2 + 3 = 5, 4 - 1 = 3)	1	2	3	4	5
3. Multiply and divide whole number. (EX: 2 x 3 = 6, 4 ÷ 2 = 2)	1	2	3	4	5
4. Round off whole numbers. (EX: 19 → 20, 14 → 10)	1	2	3	4	5
5. Read and write fractions. (EX: $\frac{1}{4}$, $\frac{3}{2}$, $1\frac{3}{5}$)	1	2	3	4	5
6. Compute dollars and cents.	1	2	3	4	5
7. Read and write decimals. (EX: .10, .25, .43)	1	2	3	4	5

NOTE: Student Questionnaire items are the same as the items on the Teacher Questionnaire except for the directions.

		NOT PROFICIENT		MODERATELY PROFICIENT		VERY PROFICIENT
8.	Round off decimals. (EX: .16 = .2)	1	2	3	4	5
9.	Multiply and divide decimals. (EX: .2 x .3 = .06, 6 ÷ .3 = .2)	1	2	3	4	5
10.	Add and subtract decimals. (EX: .1 + .02 = .12, .9 - .6 = .3)	1	2	3	4	5
11.	Read and write percents. (EX: 1%, 25%, 78%)	1	2	3	4	5
12.	Compute percentages. (EX: 5% of 50 = 2½ or 2.5)	1	2	3	4	5
13.	Convert fractions to decimals, percents to fractions, fractions to percents, percents to decimals and decimals to percents.	1	2	3	4	5
14.	Solve problems using correct order of operations. (EX: addition, subtraction, multiplication, and division)	1	2	3	4	5
15.	Use a calculator.	1	2	3	4	5
	COMMUNICATIONS					
1.	Use the dictionary.	1	2	3	4	5
2.	Understand the meaning of words in sentences.	1	2	3	4	5
3.	Use books to find information.	1	2	3	4	5
4.	Understand spoken communication	1	2	3	4	5
5.	Interpret or give your explanation to spoken communication.	1	2	3	4	5
6.	Pronounce words correctly.	1	2	3	4	5
7.	Use good word choices.	1	2	3	4	5
8.	Talk fluently.	1	2	3	4	5
9.	Organize ideas while speaking.	1	2	3	4	5
10.	Ask and answer the six W questions given a reading or speaking situation (what, where, why, when, who, and which).	1	2	3	4	5
11.	Give directions or information.	1	2	3	4	5
12.	Use the telephone by finding names and telephone numbers in a telephone directory and yellow pages, and make local and long distance calls.	1	2	3	4	5

		NOT PROFICIENT		MODERATELY PROFICIENT		VERY PROFICIENT
13.	Understand the word-for-word meaning in a reading passage.	1	2	3	4	5
14.	Read forms.	1	2	3	4	5
15.	Read short notes, memos and letters.	1	2	3	4	5
16.	Read charts and tables.	1	2	3	4	5
17.	Read manuals.	1	2	3	4	5
18.	Write statements or phrases on forms.	1	2	3	4	5
19.	Write sentences on forms.	1	2	3	4	5
20.	Write sentences.	1	2	3	4	5
21.	Write memos.	1	2	3	4	5
22.	Take notes.	1	2	3	4	5
	INTERPERSONAL					
1.	Use eye contact, attentive posture, gestures, while listening and speaking and appear relaxed.	1	2	3	4	5
2.	Identify behaviors which prevent good verbal communication.	1	2	3	4	5
3.	Understand the main idea in another's communication.	1	2	3	4	5
4.	Distinguish between fact and opinion in another's communication.	1	2	3	4	5
5.	Respond to others by asking questions.	1	2	3	4	5
6.	Restate what was said in a conversation.	1	2	3	4	5
7.	Confirm one's own understanding of a conversation.	1	2	3	4	5
8.	Pay attention to other's non-verbal cues.	1	2	3	4	5
9.	Appear self-confident while communicating with others.	1	2	3	4	5
10.	Maintain one-to-one conversation.	1	2	3	4	5
11.	Maintain task-focused conversation.	1	2	3	4	5
12.	State a point of view.	1	2	3	4	5
13.	Maintain a friendly conversation.	1	2	3	4	5
14.	Join in group discussions.	1	2	3	4	5
15.	Follow instructions or directions.	1	2	3	4	5
16.	Give instructions or directions.	1	2	3	4	5
17.	Give a demonstration of a skill.	1	2	3	4	5

		NOT PROFICIENT		MODERATELY PROFICIENT		VERY PROFICIENT
18.	Identify people's need for instruction by asking or watching their performance on the job.	1	2	3	4	5
	REASONING					
1.	Locate information about job duties, materials, and equipment.	1	2	3	4	5
2.	Locate information about job methods and procedures.	1	2	3	4	5
3.	Locate information about the proper ordering of procedures to perform a job.	1	2	3	4	5
4.	Recall ideas.	1	2	3	4	5
5.	Sort objects.	1	2	3	4	5
6.	Estimate the time required to perform regular duties on the job.	1	2	3	4	5
7.	Put work in proper order to complete a job.	1	2	3	4	5
8.	Set job priorities for doing work.	1	2	3	4	5
9.	Set job goals.	1	2	3	4	5
10.	Determine activities to reach goals.	1	2	3	4	5
11.	Decide about ways to achieve goals.	1	2	3	4	5
12.	Set standards to measure the activities to meet goals.	1	2	3	4	5
13.	Set the order in which work must be done to reach a goal.	1	2	3	4	5
14.	Determine how a work activity will assist in reaching a stated goal.	1	2	3	4	5
15.	Select the materials, tools, equipment, and methods to perform work duties.	1	2	3	4	5
16.	Relate causes to problems in a simple work situation.	1	2	3	4	5
17.	Identify potential problems given a specific set of facts.	1	2	3	4	5
18.	Carefully examine possible methods to solve a simple problem situation.	1	2	3	4	5
19.	Ask questions to identify the problem.	1	2	3	4	5
20.	Use the senses of touch, see, smell, taste and hear.	1	2	3	4	5

	NOT PROFICIENT		MODERATELY PROFICIENT		VERY PROFICIENT
21. Determine important information for problem solving.	1	2	3	4	5
22. Arrive at several possible information statements or descriptions of a problem.	1	2	3	4	5
23. Select the best statement or description of a problem.	1	2	3	4	5
24. Determine several possible solutions to a problem.	1	2	3	4	5
25. Select a possible solution to a problem from a set of alternatives.	1	2	3	4	5
26. Given a written plan, update or revise it using information or events that have occurred.	1	2	3	4	5